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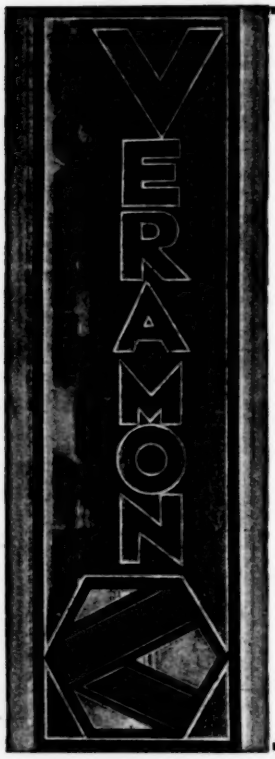

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MR. PRESIDENT, FELLOWS, AND GENTLEMEN,—Before proceeding to my lecture, I desire to express my sincere gratitude to you, Mr. President, and to the Censors of the College for the honour you have conferred upon me in inviting me to give these lectures: the gratification which I feel, however, is tempered by humility when I contemplate the long line of distinguished Fellows who have been my predecessors in this post.

The subject of calcium and phosphorus metabolism is so vast that I shall limit myself to those aspects of it which seem to me to illuminate the field of clinical medicine. If I refer repeatedly to my own observations, or to those of workers with whom I have been closely associated, it is mainly because we have used a systematic method for investigating calcium metabolism which allows of comparison between different patients and diseases.

In this first lecture I shall attempt briefly to review the normal mechanism of calcium and phosphorus metabolism and then to discuss the action of the parathyroid hormone.

NORMAL METABOLISM OF CALCIUM.

Calcium is an element essential to the life of plants and animals. In the form of carbonate and phosphate it constitutes two of the most important soil compounds. The carbonic acid of soil water converts insoluble limestone and calcium phosphate into soluble acid salts. These are in part removed from the soil by the plant, for in the germination of seeds and in the growth of plants calcium exerts a specific action. Different species of plants and different parts of the same plant contain different amounts of the element. Seeds, roots, and tubers are poorly supplied, but the green parts are especially rich, and green food is therefore the greatest source of calcium for herbivorous animals. Man derives calcium principally from milk, cheese, butter, eggs, green vegetables, and nuts.

Absorption of Calcium.

Calcium exists in our food in both organic and inorganic combination. It is probable that digestive changes convert it entirely into the inorganic form, so that it is absorbed as calcium salts partly or completely ionised. Nevertheless calcium salts given by the mouth, whether soluble or insoluble, appear to be absorbed only with difficulty. It is important to remember that an excess of calcium in the diet is desirable, for the very good reason that interaction with carbonates of the digestive juices reconverts some of the ingested calcium into insoluble carbonate, which escapes absorption and is lost in the stools.

The daily calcium requirement of an adult is between 0·4 and 1·0 g., and the latter figure can be regarded as allowing the necessary margin for safety.[1] Until the growth of the skeleton is complete the daily requirement exceeds this figure.

It has been claimed that calcium chloride is absorbed with much greater ease than calcium lactate. There is no doubt that administration of calcium chloride often produces a greater rise in the serum calcium than is the case with calcium lactate, but this is explained by the fact that the ingestion of calcium chloride in large doses produces an acidosis which is itself responsible for part of the rise in the serum calcium.

Excess of certain mineral constituents in the diet may be detrimental to calcium assimilation. The action of potassium and magnesium, in this respect, is little understood, but the influence of a large excess of phosphate is to be expected, since calcium phosphate is so insoluble. A great deal of work has been done on the relationship between calcium absorption and the sugar content of the diet. It would seem that the addition of 25 per cent. of lactose to the diet increases the absorption of calcium.[2]

Studies of the effects on calcium metabolism of the addition of fat to the diet have been pursued for many years. It was found that some fats were efficacious in improving calcium absorption whereas others were not. Attention was therefore turned to the vitamin content of fat as a possible explanation. It was then found[3] that cod-liver oil was equally effective, whether administered fresh or after oxygenation for twelve hours, whereby its content of vitamin A had been entirely destroyed. It was obvious, therefore, that the effects were not due to vitamin A, and since they were apparently not due to the fat itself, it was necessary to postulate an antirachitic vitamin distinct from vitamin A. More recent work on the effects of ultra-violet irradiation has led to the view that certain fats contain a special antirachitic substance, vitamin D. This is more resistant to oxidation than is vitamin A, and can be produced in many otherwise inactive fats, such as olive oil, by exposure to ultra-violet light. It is now known that vitamin D is a derivative of ergosterol, or some closely related sterol,[4] and that as such it can be synthesised in the skin. It seems to be the main factor governing the absorption of calcium, but whether or not it directly affects calcium utilisation in the tissues remains for future metabolism experiments to decide.

Excretion of Calcium.

It is generally accepted that calcium is eliminated by the large intestine and to a less extent by the kidney. The average concentration of calcium in the saliva is 9 mg. per 100 c.cm., in the gastric juice 6 mg., in the pancreatic juice 7 mg., and in gall-bladder bile 11 mg. By the use of Thiry-Vella pouches in dogs it has been shown[5] that calcium is eliminated to a much greater extent by the lower intestinal mucosa than by the upper. Thus daily washings with distilled water of a pouch of the upper jejunum yielded up to 1·2 mg. of calcium, the corresponding figure for the lower ileum being 8·5 mg. and for the colon 15 mg. It follows, then, that on a normal diet the fæcal calcium consists of the unabsorbed surplus together with re-excreted calcium.

The urinary excretion of calcium varies from 0·1 g. per day on a low calcium diet to 0·5 g. on a normal diet. It is perhaps not sufficiently well recognised that acid-forming diets increase the urinary excretion of calcium.[6 7] For example, it has been shown[6] that a diet consisting of bread, meat, rice, fats, macaroni, and sweets, and excluding milk, green vegetables, and fruits may give rise in the body to about 700 c.cm. N/10 excess acid. Such a diet may double the normal elimination of calcium in the urine and may cause a marked increase in the titratable acidity and ammonia output. When such an acid-forming diet is neutralised with an equivalent amount of sodium bicarbonate, there is no longer either an increased titratable acidity, or an increased ammonia and calcium elimination in the urine. This indicates that the increased excretion is caused purely by the excess of acid in the diet.

When acidosis is deliberately brought about by large doses of ammonium chloride, a very great increase of calcium excretion may be produced.[8] For example, in a normal subject on a low calcium

diet taking 12 g. of ammonium chloride a day, Aub[9] found that the urinary calcium was increased in three days from 0·1 to 1·1 g., while the fæcal calcium remained essentially unchanged. The degree of response varied with the individual, but there was always an increased calcium output.

The effects of the parathyroid and thyroid hormones on calcium excretion will be discussed later.

Calcium Content of Blood.

Very wide variations are found in the figures given for the calcium content of whole blood, serum, plasma, and corpuscles. To no small extent this is due to untrustworthy methods. The evidence is almost conclusive that the red cells of the blood contain no calcium: at the most, but minute traces can be present. Most workers state that the calcium content of the plasma is practically identical with that of the serum. There is evidence,[10] however, that in true plasma, obtained by rapid cooling and centrifuging of the blood drawn under paraffin, the concentration of calcium is 10 to 15 per cent. higher than in the corresponding serum.

In estimating the blood-serum calcium, the Kramer-Tisdall method as modified by Clark and Collip[11] gives results with an average error of 2 per cent. and a maximum error of 5 per cent. The normal figure by this method varies between 9·0 and 11·0 mg. per 100 c.cm.

Now in the cerebro-spinal fluid the figure is only 5 to 6 mg. per 100 c.cm., and in agreement with this difference it has been found that serum and plasma calcium is but little more than half diffusible. It is obvious, therefore, that calcium is present in blood plasma in more than one form. Actually it is believed to be present in three forms:—

1. Un-ionised, non-diffusible organic compounds	about 4·5 mg. per 100 c.cm.
2. Un-ionised, diffusible, or dialysable inorganic compounds..	about 3·5 mg. per 100 c.cm.
3. Calcium ions, diffusible	about 2·0 mg. per 100 c.cm.

Electrometric determinations are responsible for the last figure, and the methods for the determination of the diffusible calcium are very unsatisfactory.

The methods of dialysing the serum against distilled water or a solution of known calcium concentration are slow and inaccurate. In collodion filtration the results may be affected by the time of filtration and by the pressure employed. For these reasons we have been content in our investigations to estimate only the total serum calcium.

Certain physiological variations in the serum calcium are of interest. Thus it has been found to be higher during the first few days of life and during the suckling period than in adult life. The claim that the serum calcium rises before menstruation and then rapidly falls is based on the faulty methods of twenty years ago, and modern work fails to confirm the observation. The best attested alteration in the serum calcium occurs during pregnancy and is doubtless due to the drain on the maternal tissues to meet the growing demands of the fœtus. Bogert and Plass[12] found that the average calcium content of the serum was 9·1 mg. per 100 c.cm. for 23 women at the time of labour, and 10·2 mg. for 12 normal non-pregnant women.

It has been shown that the blood calcium of certain birds increases very considerably at the period of ovulation. Thus in female pigeons[13] a rise in blood calcium begins 123 hours before the beginning of the formation of an egg-shell. Subsequently, during a period of from three to five days these birds withstand without trace of adverse effect a hypercalcæmia up to 20 mg. per 100 c.cm. Similarly the female cod[14] in the spawning season has a blood calcium varying from 12·7 to 29 mg. per 100 c.cm., whereas the corresponding figure in the male lies between 9 and 12·5 mg. This calcium is probably required for the elaboration of the eggs, which are especially rich in that element.

Calcium in Tissues.

Speaking approximately, for there are no reliable figures, calcium is distributed evenly throughout the soft tissues in amounts comparable to those found in the blood plasma. Thus muscle contains 6·5 mg. per 100 g. When, however, we come to the skeleton the corresponding figure is about 10,000 mg. Calcium phosphate constitutes 80 per cent. of the mineral content of bone. There are in addition calcium carbonate, which makes for greater hardness, magnesium phosphate, and traces of fluoride, the last being present in greatest amount in the enamel of teeth. The protective shells of invertebrates consist almost entirely of calcium carbonate, but traces of phosphate are invariably present, and there is good ground for belief that the presence of phosphate is absolutely essential both for shell and for bone formation.

The calcium in milk is about equally divided between organic and inorganic constituents, the organic compound, calcium caseinogenate, being non-diffusible. The inorganic calcium is chiefly calcium hydrogen phosphate, with some bicarbonate and citrate. The activity of the mammary gland is responsible for a concentration of calcium which averages 42 mg. per 100 c.cm. in human milk and 120 mg. in cow's milk.

Functions of Calcium.

The most obvious function of calcium in the body is, of course, the formation of bone. It has perhaps been insufficiently emphasised that the skeleton of the mammal is not only a supporting structure, but is also a reservoir of calcium and phosphorus. Even after full growth is complete, bone salts are being continuously removed and renewed, and they are not once and for all laid down and fixed. And since bone is the only considerable reservoir of calcium in the mammal, the skeleton can be drawn upon not only for the skeletal needs of the fœtus where there is a dietary deficiency of calcium, but, apparently often as a normal procedure, as in the production of milk. The hen, on a diet deficient in calcium, can draw on its skeleton for the calcium of the egg-shell. Further, the skeleton is not the only structure which acts as a reservoir for calcium. There is experimental evidence that the shell of the egg can be dissolved by the carbonic acid produced by the growing embryo, to yield a soluble calcium salt for the needs of that embryo: 80 per cent. or more of its calcium requirements are provided from the shell.[15]

Apart from the growth and maintenance of the skeleton, calcium plays an important part in the blood and tissues by maintaining along with other ions a balanced system which determines the degree of irritability of muscle and nerve. In this way calcium ions help to control the heart beat, the contractility of plain and striped muscle, and the transference of impulses at the neuro-muscular junctions and through synapses. In general it may be stated that calcium ions play an important part in lessening the irritability of the tissues containing them.

Nevertheless wide variations from the normal can exist without apparent interference with such functions. Thus in post-operative tetany and infantile tetany the serum calcium may drop to 6 mg. per 100 c.cm. before any symptoms or signs of lack of calcium are observed. Conversely, in parathyroid over-dosage and in spontaneous hyper-parathyroidism we have observed symptomless hypercalcæmia, the serum calcium values being 19·8 and 16·7 mg. per 100 c.cm. respectively.

An important function of calcium is to aid in the coagulation of shed blood. Mellanby[16] showed that the action of calcium is specific, since, although salts of magnesium, strontium, and barium will, in the presence of thrombokinase, convert prothrombin into thrombin, none of them compares in potency with calcium. It follows that any manipulation which depletes the blood of calcium ions, such as the addition of oxalate or citrate, prevents clotting. The delayed coagulation time in hæmophilia may be due,

theoretically, to a variation of any one of the factors concerned in clotting, but there is no evidence worth the name to indicate a calcium defect.

Cases of fatal hæmorrhage after operations for obstructive jaundice may perhaps be explained by removal of calcium ions which have combined with bile salts. Little or no satisfactory work is to be found on this subject.

In the clotting of milk, calcium ions are essential in the process of converting casein into insoluble calcium caseinate, the clot mesh.

Normal Metabolism of Phosphorus.

Phosphorus is ingested in the food as nucleoprotein (meat), phosphoprotein (milk), lecithin (egg yolk, liver), and as inorganic phosphate. It is found in the blood, not only in the inorganic state, but also in combination with a variety of organic radicles. The organic compounds are acid-soluble "ester phosphorus," and alcohol-ether soluble "lipin phosphorus." It is, perhaps, not sufficiently realised that less than one-twelfth of the total phosphorus is present as inorganic phosphate.

Plasma Inorganic Phosphorus.

The plasma and corpuscles contain equal amounts of inorganic phosphorus, so that the results of analyses may be expressed as milligrammes of phosphorus per 100 c.cm. of whole blood or plasma. Most of the early work on blood phosphate must be accepted with caution, for it was not known before 1914 that the distribution of phosphorus changes when blood is allowed to stand. Once the corpuscles have been laked, the liberated organic esters are very rapidly hydrolysed by the plasma phosphatase, and the concentration of inorganic phosphate rises rapidly. However, with adequate precautions, using the method of Briggs,[17] the experimental error should not exceed 2 per cent.

In health the level of inorganic phosphate in the blood varies between 2·5 and 3·5 mg. phosphorus per 100 c.cm. In children, where ossification is more active, readings up to 5 mg. per 100 c.cm. are found. The blood obtained from the umbilical cord at birth may contain as much as 6 mg. per 100 c.cm.

The metabolism of phosphorus is closely interwoven with that of calcium, and many of the observed fluctuations in the blood phosphate can be accounted secondary to changes in calcium. There is often a reciprocal relationship between calcium and inorganic phosphorus in the blood, though this is only approximate and does not apply where absorption of phosphorus is defective.

Functions of Phosphorus.

Phosphorus compounds take part in at least four important metabolic processes. They are in some way essential to the storage or utilisation of carbohydrate, they enter into the chemical changes which precede the contraction of muscle, they are concerned with acid-base equilibrium, and they are essential to the deposition of bone.

The physico-chemical mechanism of ossification is little understood. Freudenberg and György[18] have suggested that the cartilage protein forms a compound of calcium by virtue of its acidic groups, that the resulting compound, having now a preponderance of basic groups, combines with phosphate ions, and that the calcium-protein-phosphate complex so formed breaks down with deposition of insoluble calcium phosphate and liberation of the original protein. Holt, La Mer, and Chown,[19] from their work on the physical chemistry of calcium phosphate solutions, conclude that the blood serum is to be regarded as a supersaturated solution of tertiary calcium phosphate, and that the plasma bathing the bone matrix, where solid calcium phosphate is present, readily gives up its surplus and so enables the bone to grow.

The interesting theory of Robison[20] as to the possible significance of bone phosphatase in the process of ossification has been supported by much experimental evidence. The work of Kay[21] on plasma phosphatase, in the study of certain metabolic diseases of bone, has provided circumstantial support for Robison's theory from an entirely different quarter.

Phosphatases.

For our knowledge of the distribution and possible functions of phosphatases in the body we are indebted to Robison, Kay, and collaborators. Phosphatases are enzymes which hydrolyse phosphoric esters such as glycerophosphate and hexosephosphate. Many of these esters form soluble calcium salts. Such esters are widely distributed in the tissues, mainly inside the cells. Two such esters occur in mammalian red cells, and a phosphoric ester, hydrolysable by animal phosphatases occurs, in small quantities only, in human plasma. Phosphatases also hydrolyse pyrophosphates which are said to occur in muscle tissue.

Distribution of Phosphatases.

Phosphatases are very widely distributed in mammalian tissues. In the human adult the epithelial portion of the intestinal mucosa is richest in phosphatase, the whole kidney next. There is more in the cortex of the kidney than in the medulla, and more in the mucous membrane of the intestine than in the submucosa. Adult bone contains phosphatase very unequally distributed, the enzyme being present mainly below the periosteum. Per unit weight of bone, young growing bones contain much more phosphatase than adult bones. Again the distribution is very irregular, the enzyme being present mainly in the zone of provisional calcification and in the periosteum. Fœtal bones contain a still higher proportion of phosphatase per unit weight of bone. The concentration of phosphatase in and about the cells of the ossifying zone in fœtal cartilage is probably greater than that of phosphatase in any other tissue. The fœtal kidney, on the other hand, contains considerably less phosphatase than the kidney a few days after birth.

Plasma Phosphatase.

In 1929 Kay published a method[21] for estimating the activity of the phosphatase in the plasma. He expresses this enzyme activity in terms of the number of milligrammes of phosphorus liberated as inorganic phosphate from excess of sodium β-glycerophosphate in 48 hours at 38° C. and at pH 7·6 by 1 c.cm. of plasma. Under these conditions the average value for normal plasma is 0·15 mg. In young infants the figure is higher.

In certain generalised diseases of bone the phosphatase of the plasma frequently rises to 10 or 20 times the normal. Very high figures are constant in osteitis deformans. In generalised osteitis fibrosa (three cases), in secondary carcinomatosis of bones (one case), in rickets and in renal rickets high figures have been found. On the other hand, in focal osteitis fibrosa (eight cases) and in osteogenesis imperfecta the figures are normal.

Bone Phosphatase.

There seems little doubt that phosphatase plays a part in the chain of events by which the deposition of calcium phosphate in growing bones is brought about. Robison's hypothesis[20] may be briefly stated as follows: the osteoblasts and hypertrophic cartilage cells secrete a very active phosphatase, which, by hydrolysing the phosphoric esters of the blood, brings about a local increase in the concentration of phosphate ions. The solubility product of tertiary calcium phosphate is thereby exceeded, and deposition of this salt occurs in the ossifying zone. The enzyme probably plays a part also in the maintenance and repair of bone in the adult.

The evidence in favour of this hypothesis may be briefly outlined as follows:—

1. Phosphatase is present in the growing bone in greatest amount in those areas in which deposition of calcium phosphate is proceeding most rapidly.

2. It can be demonstrated in vitro that a growing bone split longitudinally is still capable of the deposition of calcium phosphate from a solution of a

soluble calcium phosphoric ester salt such as calcium hexosemonophosphate or calcium glycerophosphate, and that deposition occurs mainly in the cells in the zone of provisional calcification.

3. Phosphatase appears in cartilage simultaneously with the appearance of centres of ossification.

4. There is no phosphatase in cartilage which is not ossifying.

5. There is a substrate for the enzyme present in red cells and also in circulating plasma.

6. In certain generalised diseases of bone the plasma phosphatase is high. This establishes another correlation between phosphatase and bone tissue, though its exact significance has still to be discovered.

Phosphatases in Intestinal Mucosa and Kidney.

Phosphatases in the intestinal mucosa hydrolyse the phosphoric esters in the food. All the evidence at present available indicates that phosphoric esters taken by mouth are absorbed as inorganic phosphates. Any phosphoric ester in the food is probably completely hydrolysed by the phosphatases of the intestinal juice and the mucosa before absorption into the blood stream. The rate of hydrolysis of various phosphoric esters is not, however, the same, so that the more resistant will probably be hydrolysed further down the intestine than the less resistant. Milk, for example, in addition to caseinogen, contains calcium phosphate in at least seven other forms of combination. These compounds of milk will be hydrolysed and their components absorbed at different levels in the intestinal tract. The peculiar ease with which the calcium and phosphorus of milk are taken up from the intestine is probably dependent upon these facts.

The kidney phosphatase possibly plays some part in the secretion of inorganic phosphate in the urine.

Methods of the Metabolism Ward.

In the study of calcium metabolism it is necessary to know, not only the levels of calcium and phosphorus in the blood, but also the calcium and phosphorus balance; for just as the level of a river does not indicate the direction in which it flows, so the levels of the figures in the blood give us, in themselves, no indication as to whether calcium is flowing into excretory channels or into the tissues.

In our studies of endogenous calcium metabolism[22 23] we have given a diet containing only 100 mg. of calcium a day but adequate in all other respects. This is necessary in order to reduce to a minimum the amount of unabsorbed calcium in the fæces. Fluid and sodium chloride intake have been kept constant, and distilled water has been used in the preparation of all food and drinks. Sufficient alkali has been given by mouth to make the reaction of the 24-hour mixed urine neutral to phenol-sulphonephthalein (pH 7·3). The fæces have been divided into three-day periods by the oral administration of 0·3 g. of carmine alum lake every third day. The urine has been obtained in 24-hour specimens.

Since inorganic salt excretion reaches a constant level only very slowly, we have endeavoured to change our conditions of study not more than once in twelve days.

Effects of the Parathyroid Hormone.

The parathyroid glands exert a specific effect upon calcium metabolism. The pioneer work of MacCallum and Voegtlin[24] demonstrating a reduction of serum calcium in dogs after parathyroidectomy has been abundantly confirmed. It is well established that this condition is relieved by the administration of calcium salts. The idea that it is due to guanidine intoxication remains unsupported by adequate evidence.

Effects of Parathyroid Extract on the Blood.

The view that calcium deficiency is the direct cause of post-operative tetany is considerably strengthened by the work of Hanson[26] and Collip,[27] who isolated an active extract of the parathyroid gland. Injections of this substance abolish tetany in parathyroidectomised dogs, the serum calcium being restored to normal.

I will illustrate this from some of our unpublished experiments.[25]

Control of Tetany after Total Thyro-parathyroidectomy in a Dog.—A dog weighing 6·5 kg. had been kept for four weeks on a meat diet. Total thyro-parathyroidectomy was performed under ether anæsthesia. Violent tetany, with extensor spasms of the limbs, appeared 16 hours after operation. The dog was found lying on its side very ill, with great muscular weakness and vomiting. There was striking hyperpnœa with a respiratory rate of 135 per minute, and laryngeal stridor with a hoarse bark. The serum calcium was 5 mg. per 100 c.cm. and the inorganic phosphorus 6·5 mg. per 100 c.cm.

An intramuscular injection of 15 units of parathormone* was given, and three hours later the dog was normal. There was no muscular weakness. Normal activity and appetite had returned. The respiratory rate and bark were normal. The serum calcium had been raised. However, unless injections of the hormone were given daily, the serum calcium fell and the dog relapsed into violent tetany.

Administration of Collip's extract to normal dogs raises the serum calcium above normal to an extent so nearly proportional to the dose as to afford a means of standardisation.

During certain observations on patients suffering from chronic lead poisoning[21] we had the opportunity of investigating the effect of parathormone on the chemistry of the blood and on calcium excretion. These patients were kept on a constant diet containing an inadequate amount of calcium. Parathormone was given by intramuscular injection either twice or three times a day. In regulating the dosage we were guided very largely by the level of the blood calcium. In five patients out of six we found that, by giving an average dose of 55 units daily, the blood calcium could be increased to 13 mg. per 100 c.cm. or more within eight or nine days. The most effective method was to give three doses a day and to increase the daily dosage continuously from, say, 20 to 100 units by adding 10 units daily (Fig. 1). This gradual elevation of the calcium level in the blood is the most dramatic effect of parathormone, but its extent varies in different individuals, and we found that it was more marked when calcium lactate was added to the diet.

Effects of Parathyroid Extract on Calcium Excretion.

Our observations on patients suffering from lead poisoning enabled us to contribute to the vexed question of the relation of the parathyroid glands to calcium excretion. Now, before the isolation of potent extracts of the parathyroids, erroneous conclusions had been arrived at as to the effect of thyro-parathyroidectomy on calcium excretion. Thus the statement of MacCallum and Voegtlin[24] that after this operation dogs showed an increased excretion of calcium has not been corroborated. Cooke[28] repeated their work and was unable to find any change in the excretion of calcium after parathyroidectomy. In spite of this contradictory report, the statement of MacCallum and Voegtlin became widely accepted. Thus arose the idea, to which Salvesen[29] later contributed, that parathyroidectomy was associated with a lowered threshold for the excretion of calcium by the intestines. It was supposed that the resulting drain on calcium kept the blood-serum calcium at a low level. Greenwald and Gross[30] have demonstrated that the true conception of the relation of the parathyroid glands to calcium excretion is the very reverse of that above stated. By a technique which eliminated many sources of error incurred in previous animal experiments, they demonstrated that dogs after parathyroidectomy actually showed a decrease in the excretion of calcium. In a later series of experiments[30] they were enabled, by the use of Collip's parathyroid extract, to approach the problem from the opposite point of view. They injected normal dogs with the extract

* Throughout our experiments we have used this preparation of Collip's parathyroid extract generously supplied to us by the courtesy of Eli Lilly and Company, of Indianapolis.

and found that the increased concentration of calcium brought about in the blood-serum was followed by an increase in the excretion of calcium.

During our investigations on patients with chronic lead poisoning we were able to make nine observations on the effects of parathormone on calcium excretion when the intake was known. It will be seen from Fig. 1 that, in such a patient, during control periods on a low calcium diet a negative calcium balance already existed, the average excess of output over intake being 0·37 g. in a three-day period. In all our observations parathormone definitely increased this negative calcium balance, the average increase being 53 per cent. The increase was roughly proportional to the dosage given. Thus, where parathormone was given in increasing doses for 16 days (Fig. 1) the negative calcium balance rose to a maximum of 1·01 g. in a three-day period, a figure very much higher than the average quoted above. When parathormone was discontinued, the calcium output did not immediately drop to normal but remained somewhat raised for periods of from three to six days.

The increase of calcium output was very much more marked in the urine, the increase of fæcal excretion being negligible. Where large doses of parathormone were given, the urinary output of calcium rose to very high figures. Thus in the case referred to above, where parathormone was given in increasing doses for 16 days, the output of calcium in the urine rose from 0·069 g. to 0·754 g. in a three-day period.

The relation between the level of the blood calcium and the calcium excretion is important. Although we found that hypercalcæmia was always associated with an increased calcium output, the converse was not found to be true. In one case large doses of parathormone failed to produce a significant rise in the blood calcium, but, in spite of this, the total calcium excretion was doubled.

In considering the physiological action of the parathyroids, the source of these large amounts of calcium appearing in the urine is of fundamental importance. We consider it justifiable to infer from our results, as Greenwald[30] did from his animal experiments, that parathormone, administered during a deficient calcium intake, causes increased excretion of calcium salts from the bones. This will be referred to later in connexion with hyper-parathyroidism and also in dealing with the question of the storage of lead, mercury, and radium in the bones.

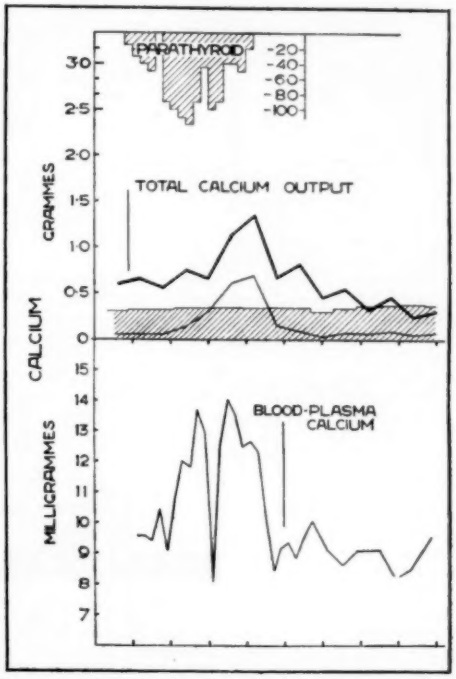
Effects of Parathyroid Extract on Phosphorus Metabolism.

Though the most dramatic effects of parathormone are on the blood calcium and calcium excretion, there is evidence[21 8] that its primary effect is on phosphorus excretion. Parathormone abruptly increases the urinary phosphorus excretion without affecting the fæcal excretion. At the same time the level of the inorganic phosphorus in the blood is reduced. When parathormone injections are stopped, the urinary phosphorus excretion rapidly falls to a level below that found before. These changes are more rapid than those just described in the case of calcium metabolism. They are also greater than can be explained by a theoretical calculation of the phosphorus liberated with calcium and nitrogen (from calcium phosphate and protein respectively), so that the excreted phosphorus is evidently derived partly from the body fluids.[32]

These remarks apply only to the primary effect of parathormone on phosphorus metabolism. If parathormone is continued in large doses a secondary effect appears later. It was first emphasised by Collip that when a certain critical level of serum calcium has been reached, following parathormone injections, the blood phosphorus rises abruptly. This may be due to an alteration in kidney function resulting from the high serum calcium, for the non-protein nitrogen of the blood also rises. Thus a later effect of parathormone on phosphorus metabolism is brought about, which is exactly opposite to the primary effect.

There are several other observations which lend support to the view that the primary action of parathormone is on phosphorus. Greenwald[30] has shown that there is a marked retention of phosphorus in the first two days after parathyroidectomy. This suggests the possibility that the bad effect of a meat diet on parathyroid tetany may be due to its high phosphorus content. Collip[33] showed that, following parathyroidectomy in the rabbit, the serum phosphorus rose without much change in the serum calcium, and that parathormone, if administered directly following operation, would prevent this rise. He stated that "these observations tend to emphasise the importance of phosphorus in relation to the pathogenesis of tetany." Further, tetany has been produced in dogs by intravenous injection of phosphates,[34] and likewise by administering large doses of phosphates by mouth.[35]

FIG. 1.



Effect of parathyroid extract on the blood calcium and on the calcium excretion.

The interval marks on the abscissa represent five days.

In the upper portion of the chart the upper block represents treatment with parathyroid, the adjacent scale indicating units per day. The lower blocks represent the calcium intake in three-day periods. The faint line represents the excretion of calcium in the urine expressed in output for three days. The heavy line is the total excretion of calcium for urine and fæces for three-day periods. The distance between heavy line and blocks therefore represents the positive or negative calcium balance.

In the lower portion of the chart is shown the blood-plasma calcium.

Effects of Over-dosage by Parathyroid Extract.

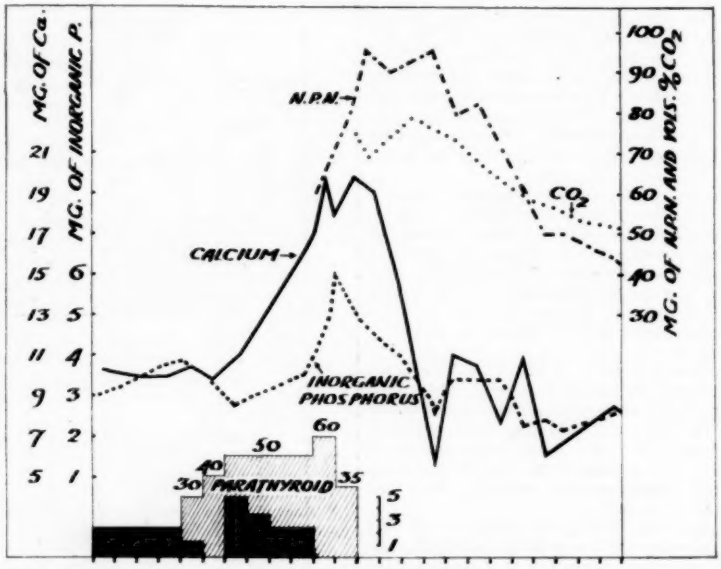
The work of Collip on dogs[27] brought to light a new entity—hypercalcæmia. This condition has since been found to occur in man, both spontaneously and as the result of parathyroid over-dosage. In Collip's observations on dogs no ill-effects were noted if the dosage of parathyroid extract was only sufficient to cause a rise in the serum calcium to 14 or 15 mg. per 100 c.cm. Large doses of the hormone, however, administered five times in the 24 hours often caused death within 48 hours of the first dose. Though in such cases the blood calcium rose to 20 or 21 mg.

per 100 c.cm., Collip made no claim that the hypercalcæmia was the immediate cause of death. In describing the condition of these animals he states that "the clinical manifestations of hypercalcæmia in dogs appear to be loss of appetite, dullness, drowsiness verging on coma, general atonia, and a failing circulation. The animals are also obviously dehydrated, the blood becomes very concentrated, and it becomes a matter of great difficulty to secure serum from blood samples for analysis even when a high power centrifuge is used. Immediately after death the blood in the heart and great vessels forms a firm clot."

Complete investigations of the blood chemistry showed that the inorganic phosphorus rose in the later stages of hypercalcæmia and that there was nitrogen retention. Thus in one dog the blood at death had a phosphorus content of 13 mg. per 100 c.cm. and a urea content of 111 mg.

During our investigations [22] a severe hypercalcæmia was produced inadvertently in one case by overdosage with parathormone.

FIG. 2.



Effect of parathyroid over-dosage on the chemistry of the blood.
The interval marks on the abscissa represent days.
A low calcium diet was given throughout. The black areas represent calcium lactate in grammes. The scale for parathyroid represents units per day. The calcium and phosphorus were estimated in blood-plasma, the non-protein nitrogen and carbon dioxide content in venous blood.

CASE 1. *Overdosage by Parathyroid Extract in Man.*—A man of 60 years (M. G. H., Reg. No. 272916, 1925), a house painter, was being treated for lead poisoning. It will be seen from Fig. 2 that he was being given a low calcium diet to which varying doses of calcium lactate were added. Calcium lactate was given for four days before commencing the parathormone. At this point, owing to an error in the interpretation of the orders, the calcium lactate was reduced and then omitted. During the next two days the dose was increased to compensate for the previous defects. Meanwhile the parathormone had been continued in increasing doses, until on the eleventh day the level of the blood calcium had risen to 19·8 mg. per 100 c.cm. It remained at this level for 48 hours; then, although all treatment had been discontinued, it fell only very gradually to normal levels during the next three days. The first effect on the plasma phosphorus was that it dropped to 2·7 mg. per 100 c.cm., but the late effect was a rise to 6 mg. per 100 c.cm., and this occurred 24 hours after the maximum rise in calcium. The pH of the blood was not estimated. The carbon dioxide content of the venous blood was 75 volumes per cent. The total base, protein, and water-content of the serum were normal (fixed base 158 c.cm. N/10 per 100 c.cm. serum; water-content, 92·2 g., protein, 6·9 g.). The non-protein nitrogen was followed from the time the blood calcium was first found to be raised. It showed a rise to a maximum or 95 mg. per 100 c.cm., this rise occurring two days after the maximum rise in calcium. During the next week it fell gradually to within normal limits.

The changes in the physical properties of the blood observed by Collip in dogs suffering from parathyroid overdosage were absent. Throughout the whole time the patient remained up and about, and, except for slight nausea and loss of appetite, appeared to be normal.

PARATHYROID TETANY.

Parathyroid deficiency occurs in clinical medicine both as post-operative tetany, following operations upon the thyroid, and as spontaneous hypo-parathyroidism, which is analogous to myxœdema. Both conditions are rare, and metabolic studies have shown them to be of great interest.

Post-operative Tetany.

Owing to the fact that radical thyroidectomy is not a common practice in this country, post-operative tetany is rare. It is not so in all countries, especially in those where operations for endemic goitre are common. In the United States, where it is customary to remove nine tenths of the thyroid gland for exophthalmic goitre, post-operative tetany is more often seen than it is here. It is for this reason that Lahey [34] examines as a routine the specimens removed at operation, and, if any tissue suggesting parathyroid is found, he transplants it into the sterno-mastoid muscle, preferably reserving a portion for histological examination.

As an instance of the severe and ultimately fatal outcome which is sometimes seen in post-operative tetany, I will refer to a case [37 38] I saw in the Massachusetts General Hospital.

Aub's Case of Post-operative Tetany.—The patient was a girl who had been examined at the age of 17, having a history of a goitre, first noticed three years before. Tremor, tachycardia, and slight exophthalmos were found. The basal metabolic rate was plus 45 per cent. Later in the same year two extensive operations were performed constituting total thyroidectomy. Two months after the second operation, attacks of difficult breathing occurred and were later accompanied by severe carpopedal spasm and sometimes by convulsions. Two years later cataracts began to appear in both eyes, necessitating bilateral lens extraction.

On examination nine years after thyroidectomy, the skin was found to be dry and the axillary and pubic hair scanty. No thyroid tissue could be palpated in the neck. Chvostek, Trousseau, and Erb signs were positive. The blood calcium was 4·3 mg. per 100 c.cm., and the inorganic phosphorus 5·6 mg. per 100 c.cm. The basal metabolic rate was minus 18 per cent. 15 units of parathormone given daily raised the blood calcium to 6·7 mg. per 100 c.cm. in 18 days. When it reached this level the attacks of difficult breathing and tetany disappeared.

The output of calcium on a known low calcium intake was estimated during this treatment, and found to be excessively low. In fact the output was almost the same as the intake and much less than that of normal individuals on the same diet. This occurred in spite of the fact that she was being given 15 units of parathormone daily, which should have caused an increase in her calcium excretion. These figures for calcium excretion are lower than those found in any other disease and indicate that the low blood calcium is due, not to an increased permeability of the kidney or intestinal mucosa to calcium, but rather to a diminished endogenous calcium metabolism and a diminished demand upon the calcium reserves in the bones.

Unfortunately, the effect of parathormone gradually diminished in this patient. Initially the blood calcium had been raised by a dose of 15 units, whereas after some months doses of 100 units had no effect at all. The results to the patient were disastrous, for the persistent low blood calcium was accompanied by severe attacks of tetany, associated with bronchial spasm, laryngeal spasm, and unconsciousness, and in such an attack she died.

Aub [8] interprets this phenomenon as an "immunity" to parathyroid extract. He states that

"unfortunately, parathormone has several disadvantages, which make its long-continued clinical use unsatisfactory at present. First, its action varies markedly in different individuals. Thus, one normal individual will show a marked reaction, while another will get no effect from a similar dose of the same extract. Second, and more important, there is an immunity to the drug which has developed in many of our cases after a few weeks of treatment. When such an immunity appears, even very large doses of parathormone exert no influence on blood calcium or phosphorus. This loss of potency has lasted in one case for a full year, and is dependent upon a resistance to the preparation and not to a drainage of the storehouse of calcium, for an increased calcium excretion followed the administration of ammonium chloride after parathyroid had proved inert. This is apparently the only active principle of a gland of internal secretion which develops such an immunity, and this effect may possibly be dependent upon the protein still present in the extract."

Fortunately, chronic post-operative tetany is often a mild disease easily controlled by calcium therapy. The following case, which I have recorded elsewhere,[38] illustrates this.

CASE 2. *Post-operative Tetany.*—A single woman of 44 years (L. H., Reg. No. 40299, 1928). She was born at Wolverhampton, where goitre was endemic, and lived there until the age of 21. At the age of 18 she first noticed a swelling in the neck, which gradually produced pressure symptoms. At the age of 22 an extensive thyroidectomy was performed. Two weeks after this operation carpopedal spasm occurred. During the 22 years which followed, attacks of tetany frequently recurred, sometimes even affecting the facial, oculo-motor, laryngeal, and pharyngeal muscles.

On examination, although no thyroid tissue could be palpated in the neck, there were no signs of myxœdema. Trousseau, Chvostek, and Erb signs were positive. Visual acuity was normal, but examination with the slit-lamp showed opacities in each lens. The serum calcium was 6·8 mg. per 100 c.cm., and the plasma inorganic phosphorus 5·4 mg. per 100 c.cm. The basal metabolic rate was minus 5 per cent.

The rational treatment was to give a high calcium diet together with thyroid extract by mouth and parathormone by intramuscular injection. The average daily dose of parathormone was 30 units and of thyroid extract grs. 6. The patient completely lost all her symptoms as soon as the serum calcium rose to normal. After five days' treatment hypercalcæmia appeared (serum calcium 16·6 mg. per 100 c.cm.).

Further study of this case showed that, on a high calcium diet together with 10 g. of calcium lactate daily, all symptoms and signs of latent tetany were abolished and the blood calcium and phosphorus figures were restored to normal. During the whole of 18 months only one relapse has occurred, and that was due to a failure to take the calcium lactate. At all other times she has been free from tetany, twitchings, and restlessness at night. She has resumed writing letters and needlework and is now successfully employed as a housekeeper, whereas for the 22 years following the operation she had been disabled from work of any kind by stiffness of the fingers.

Spontaneous Hypo-parathyroidism.

It has now been definitely shown that just as myxœdema is, as a rule, a spontaneous hypothyroidism, so an analogous condition of the parathyroids exists. This is exactly similar to post-operative tetany, except that it is of spontaneous origin. Albright and Ellsworth [40] have recorded such a case.

Case of Spontaneous Hypo-parathyroidism (Albright and Ellsworth).—A boy of 14 was admitted to hospital for the relief of tetany. At the age of 8 attacks of laryngismus had occurred, followed the next year by carpopedal spasm. At the age of 10 Chvostek and Erb signs were positive, the blood calcium being 4·9 mg. per 100 c.cm. and the phosphorus 10·4 mg. The boy then became worse, so that at the age of 14 he was having each day about 15 attacks of carpopedal spasm, sometimes with momentary loss of consciousness. The blood calcium was still low and the phosphorus high. The basal metabolic rate was minus 6 per cent. Following the administration of parathormone there was complete relief. The blood calcium was raised to 16·2 mg. per 100 c.cm. and the phosphorus dropped to 4·7 mg. However, after discontinuing the injections of parathormone, symptoms returned in one week. Seen later, at the age of 15, the boy again had tetany; the blood calcium was 6·3 mg. per 100 c.cm., and the phosphorus 10·8 mg. The urine was normal. Radiograms of the bones showed no abnormality. Ophthalmoscopic examination revealed a subcapsular lenticular opacity in the right eye and a few lenticular opacities in the left.

FIG. 3.

Post-operative tetany (Case 2).
Opacities in the lens, as seen with the slit lamp.
(From drawing by Theodore Hamblin Ltd.)

A similar case [38] has been studied in a man of 52 with a history of attacks of tetany occurring over ten weeks, followed by failing vision. On examination Trousseau and Chvostek signs were found to be present. The blood calcium was 5·1 mg. per 100 c.cm, and the phosphorus 7·3 mg. The basal metabolic rate was minus 15 per cent. Opacities were found in the lenses of both eyes.

In these two cases there are many features which strongly suggest parathyroid deficiency. The low serum calcium with high plasma phosphorus is comparable to the findings in post-operative tetany and is the exact converse of what has been found in parathyroid over-dosage and hyper-parathyroidism. The administration of parathormone relieved the tetany, raised the blood calcium, and lowered the phosphorus. Finally the occurrence of lenticular opacities is comparable to what is found in post-operative tetany.

LESIONS OF ECTODERMAL TISSUES.

Cataract, brittleness and ridging of the nails,[41] loss of hair,[42] and defects in the enamel of teeth, giving rise to several transverse ridges one above the other: all these defects in ectodermal tissues have been described in tetany. None of these changes is common, but the first is met four times as frequently as any of the other three.

The association of cataract with tetany was first recorded about 50 years ago. It has been described in endemic tetany,[43] post-operative tetany, rickets, and spontaneous hypo-parathyroidism.[40] In 1906 Erdheim [44] observed the occurrence of cataract in rats six months after experimental parathyroidectomy. Thyro-parathyroidectomy in dogs may produce opacities in the lens within periods varying from three months [45] to two years.[46] Reports of 38 cases of human post-operative tetany associated with cataract have been published [47] to date. Since 1924 it has been possible,[48] by means of the slit-lamp, to demonstrate opacities in the lens where no visual disturbance exists. Such opacities were found [49] in the following case (Fig. 3).

CASE 2 (*continued*). *Post-operative Tetany.*—No opacities could be seen in the lenses by ordinary focal illumination, or with the ophthalmoscope and a high plus lens, but with the slit-lamp three types of opacity were seen. Opacities of one type were flaky white in appearance, in some places aggregated together to form a plaque, and situated under

the zone of disjunction, the space immediately beneath the capsule being quite clear. Opacities of another type, few in number, were angular and iridescent, usually blue and red; they occurred in the same situation as the flaky opacities. There were also a few powdery opacities in the depth of the lens, in the fœtal nucleus. (Mr. C. B. Goulden.)

By systematic slit-lamp examination of all cases under investigation, we have been able, where no disturbance of vision exists, to demonstrate such opacities in one case of renal rickets, one case of tetany with steatorrhœa, and one case of osteitis fibrosa of the focal type. In the study of disturbances of calcium metabolism these observations are clearly of great interest, but in the present state of our knowledge it is impossible to draw satisfactory conclusions from them.

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CASUALTIES AT THE WEIR HOSPITAL.—At this Balham institution there were, last year, 22,919 out-patients and 642 in-patients. Of this total 13,308 were casualty cases.

PRESSURE CAUSED BY ABDOMINAL TUMOURS.

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THE purpose of this paper is to narrate a few cases of rapidly growing benign ovarian tumours, to prove that such tumours may cause albuminuria which may be cleared up by tapping or removing the cyst, and to suggest that the pressure caused by the pregnant uterus may be an indirect factor in the causation of some of the cases of toxæmia associated with pregnancy. It is, however, first necessary to get a clear idea of the facts. There is no increased intra-abdominal pressure during pregnancy any more than there is after imbibing 20 pints of beer, a feat frequently performed "auf der Kneipe" in Germany. The abdomen may well be compared with a curio-cabinet. When the cabinet is empty and closed the pressure inside is the same as that of the atmosphere. Should the cabinet be partly or completely filled with curios, whatever their size and weight, the pressure in the cabinet remains the same. The pressure on any shelf, however, would be that of the atmosphere together with the weight of the curios resting on it. Similarly, the pressure in the abdomen remains a little less than that of the atmosphere, notwithstanding the introduction of 20 pints of beer, or 100 lb. of ovarian tumour, or 14 lb. of pregnant uterus. The weight of the tumour must, however, of necessity cause traction or pressure on some part or parts within the abdominal cavity, which will vary with the posture of the individual.

A large tumour displaces or disturbs the relative positions of the various parts of the alimentary canal and presses on the diaphragm, causing displacement of the heart and lungs. It may press on the blood-vessels and ureters at the brim of the false pelvis, and it may cause rotation or kinking of one or both ureters. In the recumbent position the pressure of the weight of the tumour must be thrown on the posterior abdominal wall and the structures lying on it. It would, therefore, not be unreasonable to expect such complications as indigestion, emaciation, constipation, pain, pyelitis, and œdema of both legs as the result of a large rapidly growing intra-abdominal tumour.

I propose to give a short résumé of five cases of rapidly growing benign ovarian tumours associated with a marked albuminuria which cleared up entirely after the tumours were removed.

CASE 1.—A thin and emaciated woman, aged 23, was admitted complaining of "difficulty in breathing." Shortly after the birth of her last child some five years before she had noticed a painless movable lump, the size of a duck's egg, in the lower part of her belly. This lump had increased but slowly in size. About five months before her admission, however, the tumour had commenced to enlarge very rapidly and when she was admitted it reached to the ensiform cartilage. Her urine contained albumin, red blood corpuscles, and pus cells. Owing to her extreme emaciation and the rapid growth, it was feared that the tumour was malignant and inoperable, and the patient was nearly sent home. On June 28th, 1928, an ovarian cyst weighing 16 lb. was removed under spinal anæsthesia. The patient made an uninterrupted recovery. Within 12 days the urine was quite normal.

CASE 2.—The patient, a thin woman, aged 21, was admitted complaining of a tumour in her belly and dyspepsia. One and a half years before she had noticed a lump in her belly and had thought she was pregnant. This tumour had gradually increased in size, until it reached to a point midway between the umbilicus and the ensiform cartilage. The urine contained albumin and many pus cells. On Oct. 5th, 1928, an ovarian cyst weighing 17¼ lb. was removed under spinal anæsthesia. The patient made an excellent recovery and the urine became normal within a few days.

CASE 3.—A woman, aged 31, was admitted complaining of a large abdominal tumour. Seven years previously she had noticed a small round mass in the lower part of her abdomen on the left side. One year previously her abdomen had begun to increase rapidly in size. During the past four months she had twice been in the medical wards, where she had been tapped. Her urine on both occasions was normal. When admitted to my service she complained of a sense of fullness after meals and of obstinate constipation. She appeared to be a bag of bones and a tumour. She was cyanosed and frequently vomited dry phlegm. Her pulse was weak, and the rate was 112. Her respiration-rate was 39. Her systolic blood pressure was 90 mm. of mercury and the diastolic 55 mm. Her urine was loaded with albumin. The abdomen was enormously distended and its circumference measured 112 cm. at the level of the umbilicus. The veins on both sides of her abdomen were very distended, but there was no œdema of the legs. The patient appeared to be about to die. A week later, on April 17th, 1929, the abdomen was even more distended and the veins more marked. The apex-beat of the heart was in the third left interspace. There was marked œdema of both legs; the œdema of the body was increasing and there was anorexia and very obstinate constipation. On April 23rd the circumference of the abdomen at the level of the umbilicus was 119 cm.

On May 2nd it was 125 cm.; the œdema of the legs was enormous, and the circumference of the calves measured 36·5 cm. on the left and 34 cm. on the right. The tumour was tapped on May 5th, and 17 litres of fluid were withdrawn. On May 9th the circumference of the abdomen measured 86 cm. and that of the calves 25 and 24 cm. The apex-beat of the heart was in the fourth left interspace. The urine contained a trace of albumin. On May 20th the tumour was again tapped and 17 litres of fluid were withdrawn. Next day the cyst was removed under spinal anæsthesia and the patient made an excellent recovery. The cyst, together with the fluid removed on May 20th, weighed well over 40 lb. Her urine, which contained albumin, granular and hyaline casts, and a few pus cells, became absolutely normal within three weeks of the operation.

Note.—I went for my holidays on March 20th and did not return until the second week in May.

CASE 4.—The patient complained of a large tumour in her belly, together with oppression in the chest, some dyspnœa, and general weakness. About ten months before her admission she had noticed a mass in the lower part of her abdomen and had thought she was pregnant. This impression was heightened by the fact that she suffered from cravings, vomiting, anorexia, and insomnia. The tumour increased in size very rapidly. She was extremely thin when admitted on May 10th, 1929. The apex-beat of her heart was in the second left interspace ten inches from the mid-sternal line. The abdomen was enormously distended and large veins were visible on both sides and in the suprapubic area. There was marked œdema of both legs and of both labia majora. The urine contained a few hyaline casts but no albumin. The tumour rapidly increased in size, and the patient became weak and ill and could not take her food. On May 16th the urine contained albumin and hyaline casts. The tumour was tapped and 18 litres of fluid were removed. The apex-beat was subsequently palpated in the fourth interspace. Next day the cyst was removed under spinal anæsthesia. The patient made an excellent recovery. The tumour, together with the fluid withdrawn on May 16th, weighed well over 40 lb. On May 18th the urine contained neither albumin nor casts, nor were any abnormalities subsequently discovered.

CASE 5.—The patient was admitted on July 20th, 1929, with a large tumour in the abdomen, which was very tender. There was marked œdema of both legs and of the abdominal walls. The temperature was raised and swung around 100·5° F. She was very anæmic. Her urine contained albumin, granular and hyaline casts, and a few pus cells. By July 25th her condition was much worse; she could not eat and had marked dyspnœa. On July 30th a large multilocular ovarian cyst was removed under spinal anæsthesia. During the operation fluid oozed out freely from the cut surfaces of the abdominal incision. The material in many of the loculi appeared to be pus, but the fluid was afterwards proved to be sterile. The patient made an excellent recovery. Six days after the operation the urine contained neither albumin nor casts, nor were these abnormalities subsequently detected.

There are three other cases to which I will merely allude.

In one case an ovarian tumour, closely bound to the uterus, was almost certainly the cause of a marked hydronephrosis (post-mortem examination). In another, an ovarian tumour burrowing deeply into the broad ligament was apparently the cause of pyelitis. In the third case a moderate-sized sausage-shaped ovarian cyst, adherent to the broad ligament, caused definite pressure on the rectum.

I have the notes of 47 cases of ovarian tumour. It is interesting to note that a trace or more of albumin was present in the urine of 37 cases before operation, and in many of the cases hyaline and granular casts and pus cells were also found. I have the notes of 24 cases of large fibromyomata uteri. Albumin was detected in the urine of 15 of these patients.

On the other hand, a patient was admitted on June 22nd, 1929, complaining of a large tumour in her belly and difficulty in breathing. She had given birth to a full-term child 17 days before her admission, and was surprised that her belly remained so large. She was positive that she had no tumour in her abdomen before she became pregnant, and I found the Siamese women to be very accurate in such statements. Except for the shortness of breath she was quite well. Her urine contained a few pus cells. The cyst when removed weighed about 40 lb.

I saw, in consultation, a short Chinese woman with an enormous ovarian cyst; the circumference of her abdomen measured 180 cm. at the level of the umbilicus, and I am sure that the tumour would have weighed well over 100 lb. She complained of no symptoms and appeared to be perfectly well. She could lie flat on her back without a pillow, and in that position presented a never-to-be-forgotten picture.

It is evident that rapidly growing benign tumours may cause all the symptoms that were postulated. In two cases albuminuria developed while the patients were under observation. In all the cases, not only the albuminuria, but also the casts disappeared after the tumour was removed. It is curious how the symptoms caused by apparently similar tumours vary. Dyspnœa is sometimes present early and sometimes never troublesome. Indigestion may or may not be a feature of the case, but anorexia is usually a marked concomitant of a large tumour if it has grown rapidly. Œdema is sometimes completely absent even when the tumour is large, and only rarely affects the abdominal walls or the external genitals. Anæmia is frequently encountered with such cysts, and is not unlike that associated with pregnancy. Intractable constipation is undoubtedly the most constant symptom from which these patients suffer.

Many of the women are gravely ill and would die if surgical treatment were not available. One patient died within a few days of her admission in a moribund state. Contrary to expectation, the cyst was found at the necropsy to be benign, and the cause of her death was a double pyonephrosis, undoubtedly caused by the tumour.

I submit that there can be no difference, from the mechanical point of view, between a rapidly growing ovarian cyst and a pregnant uterus. The ovarian tumour may upset the metabolism of the body and cause the urine to contain albumin and casts. It may kill the woman, usually by causing a pyonephrosis. On the other hand, the majority of large ovarian tumours do not cause any symptoms other than a sense of discomfort and fullness in the abdomen and constipation. Similarly, the bulk of the pregnant uterus may cause albuminuria and an upset of the metabolism, and this would be more likely to occur in primiparæ with their taut muscular walls and in association with hydramnios and multiple pregnancy. The fact is certainly established that albuminuria may develop while a woman with an ovarian cyst is under observation and disappear when the cyst is either tapped or excised.

PUBLIC ASSISTANCE IN GLASGOW.—The Glasgow Corporation has taken over five general hospitals (2315 beds), three mental hospitals (2984 beds), and three institutions for mental defectives (563 beds), with staffs numbering 1953. Besides these institutions the health committee will have an interest to the extent of one-half (133 beds) in Kirklands Mental Hospital which has hitherto been administered by the Govan and Lanarkshire Lunacy Boards. It is also proposed to make a joint arrangement with the public assistance committee for the use of the hospital section of the Southern General Hospital (600 beds). Four senior assistant medical officers are to be appointed.

ON RADIATION THERAPY IN CANCER.

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THE claim of any remedy to have specific action or immediate favourable effect on a disease process has as a general rule subsequently been proved unjustified. Almost always it has been found that the action of such a remedy was mediate—acting first upon some other tissue. This finding is so frequent that it constitutes some prima facie evidence that radium, or radiation, does not act directly on the cancer cell.

The belief is current that radium does act specifically and primarily on the cancer cell. It is freely admitted that it also acts on the normal tissues, but this latter action is regarded as subsidiary and rather as a nuisance, inasmuch as it may make the application of radium difficult or even impossible. The action of radiation is considered to effect some alteration of the cancer cell which adversely affects mitotic division and so interferes with the continuity of its growth. The present technique of radiation therapy is based on this conception. If it were correct, then radiation treatment should be relatively simple; any group of similar cancers of the same region and of the same extent should respond in the same manner to the same dose of radiation. This, however, is not found to happen; some cases do well, others do little, and some do not respond at all—that is, in a favourable manner. In an attempt to explain this variability the conception of radio-sensitivity has been evolved. The cancers which do not respond are termed radio-resistant and the ingenuity of the histologists has been fully exercised in attempts to distinguish between the sensitive and non-sensitive cancers. One very carefully examined series showed that it was the cancers of medium virulence from the histological standpoint which were the most sensitive.[1] Another series showed that it was the more anaplastic, or more virulent, which were the most sensitive.[2] Yet another experiment showed that the more virulent cancer was more sensitive in the animal, but was as resistant as a very resistant cancer in vitro.[3] If radiation did act specifically or immediately on the cancer cell, the response to radiation in vitro should be different from that actually found. When the living, growing cancer cell, in pure culture, with nothing to shield it, is exposed to radiation, the result should be certain and easy to attain; yet considerably more radiation is needed to kill this pure culture than is necessary to kill the same cancer in the living animal. The in vitro dose is always much larger than the in vivo dose.[4]

Some of our experiments appear to furnish evidence against the specific action of radiation on cancer.[5] After treatment with selenide of lead—that is, after impregnation of the tissues with a compound which is ionised* by hard X rays or gamma rays [6]—the application of these rays is followed by a rapid increase in the size of the neoplasm. According to the current theory, growth should have been lessened. Mitotic division must have occurred with greater frequency than before the radiation was applied. This is found to be the case both with cancer in man and implanted cancer in mice. Further evidence against the current view appears from consideration of the regional response to radiation therapy—e.g., the differences in response to radiation of a primary carcinoma of the tongue and its metastases in the lymph glands of the neck. In this case it is the same cancer, often with no histological differences, yet in the one place the cancer is very sensitive and in the other place very resistant. These findings appear to furnish some evidence that radiation does not act primarily upon the cancer cell. The alternative is that radiation acts upon the local and/or upon the general mesoblastic defence mechanisms.

* Ionisation is to be differentiated from secondary radiation; the latter may be found to be helpful, as will be shown in an experiment below. Ionisation of the metalloid selenium appears to render it very toxic.

The Stroma.

The local defence mechanism is probably the junction tissue—this is the mesoblastic defence barrier which tries, and apparently tries in vain, to limit the spread of the neoplasm. This junction tissue is not well known and its possible significance has not been appreciated. It consists of lymphocytes, plasma cells, monocytes and macrophages, various phases of fibroblasts, eosinophil and basophil leucocytes, and the blood and lymph channels. The relative predominance of each type of cell varies from case to case, but the total amount of junction tissue is proportional to the rate of growth of the cancer or to the defence which is being offered against invasion. Slowly growing cancer has much, quickly growing cancer has little junction tissue. It has been argued that the rapidly growing neoplasms grow over the junction tissue, and so there is little; the only counter to this is to consider that the cancer overgrows the junction tissue because it is inadequate. This junction tissue is frequently termed the stroma; stroma suggests a helpful adjunct to the cancerous process. I wish to point out the possibility of an opposite rôle. The literature shows a diversity of opinion on the relative action of radiation on this tissue and on the cancer cells. Dyroff [7] concludes that though the surrounding tissues show definite changes after radiation, yet these changes are less and occur later than the changes in the cancer cells. On the other hand, Roussy [8 9] notes that there are severe changes in the surrounding tissues but variable and patchy changes in the cancer cells. In the example given—radio-sensitive tongue growth with radio-resistant metastases—the sensitivity is directly proportional to the amount of junction tissue. The primary growth is usually rich in junction tissue, the gland metastases usually poor.

Our experiments appear to strengthen this view, though final proof is not claimed. There is evidence from chemical analyses and histological appearances that the selenide is localised in the junction tissue and not in the cancer to the same extent. Numerous estimations in this laboratory, as in most others, have shown that the cancer contains little, the spleen, kidney, and liver much lead.[10] The colloid would appear to be extracted from the blood by the cells of the reticulo-endothelial system throughout the body and by the cells of this system, the macrophages, which migrate to, or proliferate in the junction tissue. Now, deep X rays and gamma rays can ionise selenium [6] and, since the toxicity of the members of the selenium group is increased by greater dispersion the ionised selenium is thought to destroy the cell which contains it. If mice implanted with Twort carcinoma in the right flank are treated with radium after injection with lead selenide, few macrophages are found in the junction tissue and few star cells in the underlying liver. Similar treatment, but substituting a non-ionisable guaiacolate, shows more macrophages in the junction tissue and many star cells in the liver. These cells are demonstrated by intravital staining with Indian ink. It is considered that the increase of growth in the cancer after applying radiation to selenide-sensitised tissue is due to this damage to the junction tissue. The damaged junction can no longer inhibit the growth of the neoplasm.

Though the views of Besredka on the importance of the local cellular as opposed to the general cellular and humoral defences are not universally accepted, most unbiased observers agree that this concept of local immunity is the only one which explains many problems. Such a local defence appears to be a factor of importance in the cancer problem, especially from the chemotherapeutic and radiological standpoints. It has long been known that surgical removal of a primary growth might be followed by more rapid growth of the metastases; Besredka's theory gives an explanation; surgical removal also removes the

protective junction tissue. There is no other explanation at present. Similarly, the apparent "stimulation" of outlying metastases after "successful" radium application to the primary growth can be explained as damage to, or inhibition of the junction tissue from too heavy a dosage.

A different explanation is current—that there exists a stimulating dose somewhere at the periphery of the radiated zone. That there is a stimulating dose appears certain, but this dose is very small and has a narrow range. If stimulation were the explanation, then metastases should be stimulated at about equal distances from the primary, and contemporary recurrences should roughly be symmetrically arranged around the primary. This is not the case; recurrences are found quite near to, and at a long distance from the radiated zone, and it is very difficult to believe that the proximal and the distal metastasis each received this very small stimulating dose. On the whole the first explanation is considered the more likely, especially as it explains the "stimulation" which follows surgical removal, for here there is no possibility of radiation stimulation. This conception implies that, though the junction tissue fails in the end to prevent invasion and metastasis, it still keeps up its inhibitory action, both on the primary and on the outlying metastases.

The General Defence.

Local defence, as conceived from Besredka's theory and applied to the junction tissue, cannot be the only defence mechanism against the proliferation of a malignant neoplasm. Evidence for a general defence is obtainable from the behaviour of implanted cancer in animals and from clinical observation of cancer patients treated by medical methods. Successful treatment of cancer in man is accompanied by definite changes in the blood [13]—increase of small lymphocytes and eosinophil leucocytes and a diminution of that lipase which can split tributyrin. In addition we find more or less intense fibrosis around the growth and sometimes calcification in and around it. So far as can be said at present, no case of cancer in which these changes have not followed selenide treatment has shown any beneficial response. We call the cases which do not show these changes non-reactive, and the outlook is bad. On the other hand, satisfactory blood changes may occur in cases which do badly in the long run—that is, a reaction has been evoked but was apparently not sufficient to inhibit the cancerous process. In this latter group there is usually evidence of some action; the growths show an unusual softening which frequently amounts to liquefaction. There is a fair amount of evidence other than this that the small lymphocytes and the eosinophils play an important rôle in cancer.

The evidence for participation of the reticulo-endothelial system in the general defence mechanism (in contradistinction to the action of the cells of this system, the macrophages, in the junction tissue) is abundant. When the activity of the system is diminished or paralysed by blockade—that is, when every cell has completely filled itself with the particles of an electro-negative colloid extracted from the blood stream—the implantation of cancer is facilitated. Erdmann [13] found that a certain number of tumours resulted from inoculation of cell-free filtrate of rat cancer and from choloroformed implant after blockade; this never occurred in the intact animal. Several observers [14 15] have found that mouse cancer could be successfully implanted into rats after blockade, whereas this never happens otherwise. A similar result has been found to follow partial removal of the reticulo-endothelial system, as occurs after splenectomy (until sufficient time has elapsed for regeneration) and after prolonged X radiation of the whole animal. Thus, Brûda [16] found that mouse cancer could be successfully implanted in rats after 30 minutes' radiation and within two weeks after splenectomy. On the other hand, certain virus cancers will not take after previous X radiation of the site of the implant; this is considered to be due to destruction of the fibroblasts, which are the necessary "culture medium" for these cancers. This same explanation has been given for the regression of implanted cancer in mammals after previous X radiation of the site, but this is wrong, for Vorländer [17] has shown that in rats the regression is accompanied by an ingrowth of fibroblasts into the regressing implant. The failure of mammalian implants to take after radiation may possibly be more correctly explained by a stimulation of the local mesoblastic defences, for it will be shown that such a stimulation actually occurs. Zacherl [18] noted that large doses of radiation crippled the reticulo-endothelial system like the blockade, and measured the damage by noting the diminution of the power of storing an inert electro-negative colloid. Large doses of radiation therefore appear to interfere seriously with the defences against neoplastic proliferation, and this defence is largely the rôle of the reticulo-endothelial system. Brûda [16] found that the plasma of splenectomised animals is a much better culture medium for cancer cultures than the plasma of the intact animal. Further evidence of the protective action of the spleen appears from the inhibiting power of spleen extract of rabbits "vaccinated" by injections of cells of mouse cancer against the taking of this same mouse cancer in mice.[20] Similarly, it had been found that an extract of rabbit spleen which has been stimulated by small venous doses of an inert colloid also inhibits the implantation of cancer.[19] The active principle of this stimulated spleen has been termed mesochymin; it inhibits the taking of implants, but has little or no action once the graft has really taken.

There are two ready methods of testing the reactivity of the reticulo-endothelial system as a whole and noting the variation in its activity which results from radiation and chemotherapy.

1. Kaufmann's test.[21] This is the response of the body to a constant irritant, a cantharides blister of constant size applied for a constant time. The amount of fluid and the number of lymphocytes and monocytes per c.mm. are noted. It is found that cancer patients yield fewer lymphocytes than normals, and that as cachexia progresses the yield further diminishes. Heavy dosage of radiation diminishes the number of lymphocytes but weaker dosage increases it. Mild X radiation of the spleen and ultra-violet radiation of the skin both increase the response in the direction of normality.[19]

2. Freund's and Kaminer's test.[22] The serum of non-cancer cases produces an appreciable cytolysis of a suspension of cancer cells; the serum of patients with cancer has less or none of this action. Zacherl [18] has confirmed this test and has found that, though heavy X radiation lowers what response there is, lesser doses tend to increase the response in the normal direction. That this, again, is due to stimulation or depression of the reticulo-endothelial system would appear from Perachia's [24] finding that Freund's and Kaminer's test became negative after splenectomy.

It is suggested that instead of guesses at the response which is considered likely in any cancer—e.g., so many kilovolts or so many milligramne-hours—the reactivity of the patient should be tested by a small dose of radiation on the cancer. By testing the patient before and after this trial radiation it should be possible to determine more accurately the patient's reactivity and thus modify the dosage. It should also be possible to measure the responses and, it is hoped, watch the reactions become more normal as improvement follows. Then, too, those substances which have been shown to exert an action on the junction tissues—selenide of lead and certain fluorescin derivatives [25]—should be carefully employed. The selenide must not be used before radiation.

Summary.

There is plenty of evidence that radiation affects the cancer cell adversely, probably by inhibitory action on mitotic division, and thus prevents the continuity of the cancer process. It is here considered that this immediate action may be less important

than, or even be produced by, the mediate action of radiation which takes place: (1) locally in the junction tissue, a stimulation of its defence; (2) generally in those parts of the mesoblastic tissues which are concerned with defence mechanisms, especially certain cells of the blood and the cells of the reticulo-endothelial system.

Acceptance of these views will entail further modification of radiation technique in the direction of smaller doses applied for longer times, or at repeated intervals, and also greater screenage. This is the trend of radiation therapy, except teletherapy, which is still under trial in this country, though it has been discarded in others. A fresh viewpoint may help to prevent the disappointment for which the current conception of radiation and the resultant technique are responsible.

It is impossible to refer to all who have afforded some of the data on which this paper is based, as they are too numerous. Some have been noted in the references. Some are indirectly due to Dr. W. C. Stevenson, of Dublin, and some to Dr. J. A. Murray and the staff of the Imperial Cancer Research Fund. I am much indebted to my assistants of the Bristol Royal Infirmary Cancer Research Laboratory.

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ANGINA PECTORIS AND CORONARY DISEASE.

BY DOUGLAS HUBBLE, M.B. LOND.

IT might be thought impossible, after a century and a half of research, to devise a new theory of the causation of angina pectoris, but quite recently a reputable American author[1] conceived the idea that the pain in angina pectoris was due to the stretching of the coronary arteries following the rupture of calcareous plaques in their walls. Other theories which are equally improbable can be unearthed in the literature, and any theory advanced must be scrutinised in the light of the fact that undoubted angina pectoris has now been described in association with a wide variety of pathological states.

These conditions include coronary artery disease, aortitis, aortic regurgitation, severe anæmia, myxœdema, paroxysmal tachycardia, and arterio-venous aneurysm. Keefer and Resnik,[2] in a comprehensive review of the subject, support the view that in all these conditions the common factor is an anoxæmia of the myocardium. I accept this theory, but it is interesting to review those theories of the pathogenesis of angina pectoris which are, at the moment, most strongly supported. They incriminate three anatomical structures—the coronary arteries, the aorta, and the myocardium.

The Coronary Arteries.

This theory, in its original form, stated that the underlying factor in all cases of angina pectoris was disease of the coronary arteries. It is the oldest of all theories and was first advanced in the day of Jenner and Parry; and Huchard,[3] who made brilliant investigations in support of this theory, wrote—

"Cette énumération n'est pas inutile pour donner la preuve qu'un auteur qui voudrait s'approprier, avec la priorité de cette théorie, le labeur de tout un siècle, commettrait un déni de justice à son profit."

Although it has been strongly assailed, this theory has received a great fillip in recent years by the widespread recognition of the syndrome of coronary thrombosis. Parkinson and Bedford,[4] in their very able discussion of this condition, write: "we believe that the study of coronary thrombosis has nailed angina for ever to the tree of decaying coronary arteries." Without supporting this view in its entirety it is true that the pain of cardiac infarction and the pain of angina pectoris are sufficiently similar to suggest a common origin for both conditions. Allbutt[5]—writing, however, in 1915 before the syndrome of cardiac infarction was thoroughly appreciated—stressed the differences between the two conditions, and many authors since his day have elaborated them.

There were two original objections to the complete acceptance of the coronary theory. It was soon recognised that many cases which were found at post-mortem examination to have extensive coronary disease, even with obstruction, had no history of attacks of angina. Investigations into the coronary circulation have done away with this first objection. It is now known that the anastomosis between the various branches of the coronary system is often very extensive and sometimes, even in an acute obstruction, so free that the supply of blood to the myocardium is not seriously jeopardised and no anginal pain develops. The second objection is not so easily dismissed. Cases of angina pectoris in which there is no demonstrable lesion of the coronary arteries have frequently been described in the literature. These cases have been examined very critically by many authors and the conclusion is inevitable: angina pectoris can occur in the absence of any coronary lesion.

Coronary spasm.—To account for these cases the ingenious and attractive idea of a spasmodic constriction of the coronary arteries was mooted, but it has remained a hypothesis which is not very susceptible of proof; and if the myocardial anoxæmia theory is accepted it seems to do away with the need for any theory of coronary spasm. Keefner and Resnik[2] oppose this further development of the coronary theory on other and more debatable grounds. Firstly, they say that it "is difficult to understand how vasoconstriction could affect a coronary artery which was already altered by coronary sclerosis." But surely the theory of coronary spasm was advanced to account for those cases in which there was no demonstrable coronary disease. No one, to-day, postulates vasoconstriction in a calcareous artery. It is enough for the production of angina pectoris that when the myocardium calls for an increased blood-supply the diseased artery fails to dilate. Again they say, "one would expect, if coronary spasm were the actual cause of angina pectoris, to find fairly frequent examples of myocardial infarct without organic obstruction of the coronary arteries." This seems an unreasoning argument. Is it rational to expect a temporary and relative diminution in the blood-supply of the myocardium to result in

the production of a myocardial infarct? They have previously admitted that a permanent and absolute occlusion of a branch of the coronary circulation may not result in an infarction owing to an adequate coronary anastomosis. In their third objection to the theory of coronary spasm it seems likely that they are on surer ground. They quote the animal experiments of Anrep and Segall,[6] which prove that vasoconstriction of the coronary arteries is due to vagal action—and stimulation of the vagus is always accompanied by a slowing of the heart rate—and they quite rightly point out that there is no characteristic alteration of the pulse-rate in angina, and certainly no constant deceleration.

To sum up the present position with regard to the coronary theory one may say that, although a coronary lesion is present in most cases of angina pectoris, yet it is impossible to accept the theory as a complete explanation for all cases of angina pectoris; and that the occurrence of coronary artery spasm as a factor in the causation of angina pectoris is by no means proved, and is an unnecessary hypothesis unless there is proved to be no condition present which is capable of producing an anoxæmia of the myocardium.

The Aorta.

Clifford Allbutt[5] first incriminated the aorta. His view was that the pain of angina was due to tension of the first part of the aorta, which was invariably the seat of an inflammatory lesion. Sudden death occurring in angina was in his opinion due to vagal inhibition of the heart's action. The main support for this theory rests on the finding of an aortic lesion in most cases of angina pectoris, and it is undoubtedly true that the post-mortem records of patients who have suffered from angina during life show, as a rule, either aortic atheroma or syphilitic aortitis. The relevant objections to this theory may be briefly stated:

(*a*) Many cases of angina pectoris have been recorded in which no disease of the aorta was demonstrated after death. Allbutt confessed, for example, that he was unable to account for the occurrence of angina in aortic regurgitation of rheumatic origin.

(*b*) Aortic lesions occur very frequently without anginal symptoms. For instance, on this theory, it is difficult to account for the rarity of angina pectoris in aneurysm of the aorta.

(*c*) The average age incidence of syphilitic aortitis is a decade earlier than the average age incidence of angina pectoris.

(*d*) The theory of death from vagal inhibition is inadequate. Lewis[7] writes: "To accuse the vagus when unexpected syncope terminates life, in the absence of clear evidence of its responsibility, is unjustifiable." It is probable that sudden death in angina pectoris results from ventricular fibrillation, and there is no experimental evidence to show that fibrillation of the ventricle is dependent on vagal stimulation. Again, there is no evidence that the vagus is stimulated during an attack of angina pectoris; there is neither slowing of the heart-rate nor any evidence of auriculo-ventricular block.

(*e*) The high rate of incidence of aortic changes accompanying angina pectoris is well explained by an alteration in the coronary circulation. Aortic atheroma is often accompanied by coronary atheroma and in syphilitic aortitis the mouths of the coronary arteries are often obstructed. It has also been recently suggested by East and Bain[8] that advanced atheroma of the aorta results in a diminished elasticity which impairs the head of pressure regulating the coronary circulation.

Wenckebach has given his strong support in recent years to the aortic theory without, however, adding very much to the evidence already marshalled by Allbutt.

The Myocardium.

There has been a growing consensus of opinion in this country and in America that, whatever may be the exact cause of the pain in angina pectoris, the original impulse arises in the cardiac muscle. Three main theories have been advanced which involve the myocardium.

(1) *Myocardial exhaustion.*—Sir James Mackenzie was responsible for this theory,[9] which suggests that the underlying factor in angina pectoris is an acute cardiac exhaustion. This hypothesis is an example of the over-simplification which was Mackenzie's tendency in later years in his endeavour to strike to the foundations of a subject. It is obvious that he was fully convinced of the importance of coronary disease as a factor in angina but, being puzzled by those cases in which the coronary arteries were not involved, he resorted to the idea of myocardial exhaustion. This conception is, in any case, too vague to be satisfactory, but there are also many objections to it.

Angina pectoris declares itself in the heart which has a reasonably good reserve and if, later, that heart should fail (true myocardial exhaustion) then the anginal attacks tend to disappear. Why should angina appear in a heart which is exhausted by reason of coronary disease, aortitis, or aortic insufficiency, and yet be invariably absent in a heart which is exhausted by the handicap of a stenosed mitral valve? In his last book,[10] written just before his death, Mackenzie says no word of this theory.

"Although," he writes "one can trace angina pectoris to the heart muscle, and although we can recognise from the various illustrations given that voluntary muscles made to contract when deprived of blood give rise to pain, and although it can be demonstrated in many cases of angina pectoris that the heart muscle was deprived of blood and that pain resulted when there was a demand for more blood, as on effort, yet it is not quite clear how these impulses, which could not arise from a greatly increased number of muscle cells contracting, give rise to pain."

He had left London for St. Andrews and turned his attention from the cause of angina to the actual mechanism of pain-production.

(2) *Myocardial distension.*—Poulton,[11] in an endeavour to bring anginal pain into line with what may be called the Guy's Hospital theory of pain-production in hollow muscular organs, writes of angina pectoris: "On the analogy of œsophageal and gastric pain, cardiac pain would be due to a tonelessness and consequent stretching of the muscle, and amyl nitrite may possibly act by stimulating the muscle to contract down on its contents." It is possible that the pain of congestive heart failure may be brought about in this way,[12] but there are several reasons for believing that the pain of angina pectoris, being different in character, has an entirely dissimilar origin. The objections to this theory are:

(*a*) That the pain of angina pectoris tends to disappear when congestive heart failure—i.e., tonelessness and stretching of the muscle—supervenes.

(*b*) Many cases are recorded which suggest that when cardiac infarction occurs in a heart which is already failing—i.e., in a distended heart muscle—the typical anginal pain is absent.

(*c*) There is no evidence of any sort to show that amyl nitrite causes the cardiac muscle to contract down on its contents. According to Cushny[13] and Dixon,[14] amyl nitrite has no direct action on the heart muscle, except in toxic doses in the frog when the contractions are weakened—as would be expected from the action of the drug on unstriated muscle.

(*d*) There seems to be no special reason, except on morphological grounds, why the origins of gastric and cardiac pain should be analogous, even if Poulton's explanation of gastric pain is accepted. The structure, function, and properties of the two muscles are so dissimilar. The fact seems to be that there is no condition occurring in the stomach or œsophagus which is at all comparable to angina pectoris.

(3) *Myocardial anoxæmia.*—This last theory maintains that the pain of angina pectoris arises in the cardiac muscle and is invariably due to temporary oxygen-lack. Stated more broadly,

anginal pain arises from a disproportion between the oxygen demands of the cardiac muscle and its available oxygen supply. This definition thus includes the pain of coronary thrombosis. This theory is but an extension of that development of the coronary theory which says that angina is due to an inadequate coronary circulation; it is more precise in definition and it spreads the net a little wider so as to include cases not covered by the coronary theory. It is no new theory, but it has recently been elaborated by Keefer and Resnik[2] in an admirably comprehensive review (to which I am indebted); it does not differ so deeply from the coronary theory as these authors suggest, but it is definitely a distinction which is worth emphasising. In a review of the literature they state that "when the facts are complete it is possible to demonstrate anoxæmia in practically every case." That this is so in angina with coronary artery disease is plain, but in many other conditions the anoxæmia factor is not so obvious. Three examples given by Keefer and Resnik may be quoted. A common condition with which angina is sometimes associated is aortic insufficiency, and both Allbutt and Mackenzie were puzzled to explain this connexion; Smith and Miller[16] have shown that the blood flow through the coronary arteries was actually decreased in experimental aortic insufficiency in dogs and that this disease was due to a lowering of diastolic pressure—sufficient evidence that in aortic regurgitation there is an anoxæmia of the myocardium. Several cases of angina occurring in association with severe anæmia have been recorded, and many observers have pointed out that the attacks of angina were dependent on the degree of anæmia and that as the blood picture improved the angina disappeared. In these cases it is impossible to escape from the conclusion that the angina must be dependent on a diminished oxygen-supply to the cardiac muscle. Again, attacks of angina have been described in cases of arteriovenous aneurysm, a condition which results in a lowering of diastolic pressure and a diminished flow through the coronary arteries.

If it is accepted that anoxæmia of the myocardium is present in almost every case of angina pectoris can it be shown that this condition will produce the symptoms of angina? It has to be admitted that while the evidence for this is strong, it is not conclusive, nor does it seem likely that direct proof will ever be available; but the case for this theory has been enormously strengthened by the recognition of the syndrome of coronary thrombosis—a condition which causes acute anoxæmia of part of the myocardium. The distinction between the pain of simple angina pectoris and of coronary thrombosis is solely one of degree, and in essential characteristics the pain in the two conditions is identical. The experiments of MacWilliam and Webster[13] with skeletal muscle provide a suggestive analogy. They found that when the blood-supply of the arm is cut off by constriction pain is not experienced, even for 20 minutes, providing the arm is at rest, but that when the muscles are made to contract the arm is very much more quickly fatigued than the normal arm, and that when the fatigue-point is reached there is very severe pain. If this analogy is permitted, anginal pain may result because the cardiac muscle has to go on contracting notwithstanding an anoxæmia. This theory also provides an adequate explanation of the sudden death which takes place frequently in angina pectoris. It is now generally believed that the sudden death is due to ventricular fibrillation, and Sir Thomas Lewis showed 20 years ago[17] that ligation of the coronary arteries in animals caused ventricular fibrillation and death. It seems probable therefore that instant death due to ventricular fibrillation is particularly likely to develop in conditions which produce anoxæmia of the myocardium. This theory does not explain all the problems of angina pectoris and several questions remain unanswered but, to an impartial observer, it is certain that there are many fewer objections to this than to any other theory and that it is, at least, the one theory which is not at any point inconsistent with the enormous mass of recorded fact.

Coronary Thrombosis and Angina Pectoris.

There has been much discussion concerning the distinction between the pain in simple angina and the pain in cardiac infarction. Allbutt,[5] for example, in maintaining an aortic origin for angina, stressed the differences in the two conditions, while others have pointed to their essential similarity as a proof of the coronary hypothesis. Much has also been written of the differential diagnosis of the two conditions, and confusion has arisen because insufficient distinction is made between coronary disease with and without cardiac infarction. Lambert,[18] for example, in an otherwise excellent article on cardiac pain, gives a differential diagnosis as follows.

Coronary Disease.	*Angina Pectoris.*
Pain often epigastric.	Pain sternal.
Pain of long duration.	Pain temporary.
With dyspnœa.	Without dyspnœa.
Occurring at night.	Brought on by effort.
Unrelieved by nitrites.	Relieved by nitrites.
Râles in lungs.	No signs in lungs.
Fall of blood pressure.	Blood pressure unaltered or raised.
Arrhythmias present.	Arrhythmias absent.

It is obvious that the last four signs in the first list are not signs of coronary disease at all, but signs of cardiac infarction and, as the first part of this article has amply demonstrated, angina pectoris itself is often evidence of coronary disease.

The differential diagnosis between simple angina pectoris and cardiac infarction is sufficiently obvious. In the latter condition the duration of the attack, the collapse, the pyrexia, the fall of blood pressure, the nausea and anorexia, and the signs of congestive heart failure in the liver and lungs soon establish a diagnosis beyond doubt. But the diagnosis between a shower of anginal attacks which is the prelude to cardiac infarction and attacks of simple angina pectoris is not so straightforward, yet it is important, from the point of view both of prognosis and of treatment, to make this diagnosis. The following case illustrates well the various diagnostic points.

The patient was a male aged 63. On May 13th, 1929, he complained of chest pain which had started three weeks previously. The pain was situated over a wide area between the lower end of the sternum and the left nipple, and radiated up to the jaw and the left side of the head. The pain commonly started when he was walking but occasionally the onset bore no relation to any effort; in fact, on the morning he was first seen, the pain had come on at 6.30 while he was lying in bed. Its character was gripping and constricting, and it was moderately severe. The duration was usually a quarter of an hour, but occasionally it lasted as long as three hours. He stated that during the previous winter he had been increasingly dyspnœic on exertion. On examination his heart was enlarged, with the apex-beat half an inch outside the left nipple line, and the sounds were distant. His blood pressure was 162/104 mm., and there was a trace of albumin in his urine. The pulse-rate was 68. The brachial artery was thickened and easily palpable. A diagnosis of angina was made, though it was realised that the symptoms were slightly atypical. He was put to bed and given tabellæ of trinitrin (gr. 1/100), which he was told to take at the onset of his pain. This he did, and when next seen he said that one tablet gave him complete relief from his pain within five minutes but that his pain invariably returned in two hours. This relief given by nitrites was thought to confirm a diagnosis of true angina. Four days later he stated that his pain was distinctly more severe and more persistent than when he had come to bed, and the fact was puzzling. The next night at 11.30 he had a severe attack of his pain, which was not influenced in the slightest degree by trinitrin; this attack for the first time was accompanied by dyspnœa and at 5.30 the next morning he had a similar attack which persisted until he was seen at 11 A.M., in spite of the fact that during these few hours he had taken gr. 1/25 of trinitrin and inhaled vigorously a 5 minim capsule of amyl nitrite. At midday his pain became agonising; he was pale, cyanosed, sweating, and restless. His temperature was subnormal, his pulse-rate, though regular, had dropped to 50, and his heart sounds were weaker than before his acute

attack. His systolic pressure had dropped to 106 mm. It was then realised that his heart was infarcted, and he was given morphia and all vasodilators were withdrawn.

Next day there was no doubt about the diagnosis. He showed the characteristic appearance of cardiac infarction. His tongue was heavily furred, he had vomited once, there was no desire for food; his stomach, he said, was unsettled. His blood pressure was 108/80 and his temperature was 101°. His pulse was regular and the rate had risen with the pyrexia to 74. The heart sounds were weak. There were no signs of pericardial friction or passive congestion. His pain had disappeared but there was a resultant heavy soreness and stiffness over a wide area of the chest and the left side of the face. He was emphatic in his opinion that the only thing that differentiated his pain of the day before from the pain of the previous three weeks was its severity. Situation and character were identical. Two days later he desired to defæcate, and having tried to use the bed-pan and failed he was allowed by his nurse to rise from his bed and use the commode. Ten seconds after getting back to bed he complained of an acute pain in his chest, collapsed immediately, and died 70 hours after the onset of the infarction.

This is clearly a case of coronary thrombosis and cardiac infarction with prodromal anginal attacks of increasing severity lasting over several weeks. Parkinson and Bedford[4] mention nine cases of cardiac infarction with prodromal anginal attacks; they refer to it as the ingravescent anginal state and it corresponds to the status anginosus of earlier authors. It is impossible to be sure what is happening in the heart in the prodromal anginal attacks; either the attacks are dependent on a gradual narrowing of the lumen of a main branch of the coronary circulation or, less probably, they are due to the thrombosis of small branches of the coronary arteries—branches too small to give the characteristic picture of cardiac infarction, owing to an adequate collateral circulation. It is certain that in patients who have anginal attacks the coronary circulation is always hovering on the edge of inadequacy and the cardiac effort which may produce an attack depends on the condition of the coronary arteries.

When the coronary arteries are but slightly diseased, strenuous effort may be necessary to bring about the relative anoxæmia of the myocardium; when the walls of the arteries are grossly damaged they will be unable to adjust their lumina to the call for an increased blood-supply, and only slight effort is needed to produce an attack. In coronary thrombosis the blood-supply is definitely obstructed and the attack may occur when the heart's requirements are minimal—with the patient in bed at rest.

Diagnosis of Prodromal Anginal Attacks.

From the point of view of treatment it is important to differentiate these attacks from simple angina pectoris. Unlike typical angina, the attacks may come on independently of effort or emotion and are not relieved in a short time by absolute rest. The patient himself realises this, and it is unusual to find the complete immobility associated with angina. The initial attacks may be of short duration, but in hours or days they return with increased frequency and greater severity until they merge into a prolonged anginal state which culminates in typical cardiac infarction. The whole process may occupy days or weeks. The attacks are often, at their height, accompanied by dyspnœa. Some authors have attempted to differentiate these prodromal anginal attacks from simple angina by differences in the character, the position, and the intensity of the pain, but, as in the case quoted above, these points usually offer no help in diagnosis.

The Reaction to Nitrites.

Great stress has been laid by various authors on the fact that the nitrites, while giving relief in angina pectoris, give no relief in coronary thrombosis or its prodromal anginal attacks, and this fact is often quoted in the differential diagnosis. A consideration of the case quoted above does not, however, bear this out. The nitrite relieved the patient's pain for the period of its pharmacological action, and when the effect of the drug wore off his pain returned with the same or greater intensity. This reaction to nitrites, if proved to be constant, will be enough of itself to give warning of the threatening thrombosis.

The mode of action of nitrites in relieving the pain of angina pectoris is still doubtful; they probably act both by lowering the systolic blood pressure and by dilating the coronary arteries—i.e., at the same time diminishing the work of the heart and increasing its blood-supply. It is impossible to say which of these two actions is the dominant one, but it is probably correct to say that the nitrites can have little or no vasodilating effect on grossly diseased coronary arteries. In the case quoted above the nitrite may have relieved the patient's pain by lowering the blood pressure and lessening the work of the heart, but it is also probable that it had a vasodilating effect, not on the artery in which the thrombosis was gradually occurring, but on other vessels in the collateral circulation, thus relieving temporarily the anoxæmia in that part of the myocardium which was threatened with infarction. Nitrites are obviously contra-indicated in cardiac infarction, as many authors have pointed out, but a consideration of this case suggests that they are also dangerous in cases of ingravescent coronary thrombosis; it is noteworthy that after the temporary relief from the nitrite had passed the pain returned, often with increased severity. It seems probable that by lowering the blood pressure the nitrite accelerated and aggravated the cardiac infarction, for animal experiment has shown that to get the largest area of infarction it is always necessary to lower the blood pressure artificially.[19] This demonstrates the importance of making a differential diagnosis between angina pectoris and a developing coronary thrombosis; for the remedy which is beneficial in simple angina pectoris is actually dangerous (though apparently of temporary benefit) in the prodromal anginal attacks of coronary thrombosis.

The diagnosis of these prodromal anginal attacks rests, then, on five points: (1) the onset unrelated to effort; (2) the failure of rest to relieve the pain; (3) the recurrence and increasing duration of the attacks; (4) the accompanying dyspnœa (not invariable); (5) the typical reaction to nitrites.

When the attacks proceed to cardiac infarction then the diagnosis is straightforward, thanks to the careful researches of recent years in America and in this country.

Derby.

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MANFIELD ORTHOPÆDIC HOSPITAL.—The annual report of this institution, in the outskirts of Northampton, states that last year the work expanded in all departments, 235 patients were admitted and over 1000 out-patients were treated. Satisfaction is expressed that patients who are not cripples in the ordinary sense of the word but who suffer from deformities and disabilities which would ultimately result in crippling, are being dealt with at an early stage.

THE SIGNIFICANCE OF SWEATING IN MAN.*

BY YAS KUNO,
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THAT the regulation of the temperature of the body is almost the sole object of sweating has been a current view for many decades and, so far as I am aware, no serious objection has ever been raised against this opinion. I have, however, long been sceptical about its truth, as medical writings often state that sweating may be provoked not only by an increase of the temperature of the surroundings or muscular exercise but also by emotion or mental stress. It is quite reasonable that the former, which always result in an increase of the temperature of the body, cause sweating—a process of heat elimination. But we can hardly understand why the latter, which have little bearing on the body temperature, should also be a cause of sweat. There seems to be room still left for the assumption that sweating may have some other purpose.

In this laboratory my collaborators (Dr. K. Ikeuchi, Dr. T. Kosaka, and others) and I have been engaged in research work on the subject of sweating for about eight years. As a part of this, we made experiments with the purpose of answering the above question, and recently we have come to the conclusion that sweating in man is, in respect of the features of secretion as well as of its physiological significance, not uniform all over the body surface, and that it should be classified at least into two different categories. In the present paper I shall discuss the essential points of our experiments. All were carried out on man. The measurement of sweat was not made on the whole body surface, but on an area of skin of about 20 sq. cm. The amount of sweat discharged from this area every five minutes was determined and, using this amount as the unit, changes in sweating were observed for considerable periods of time. Such a measurement was, as a rule, carried out on two different parts of the body surface at the same time. The portions of the skin at which the measurements were to be made were covered with celluloid dishes, 20 sq. cm. in diameter, furnished with two side tubes through which a dry air current passed over the skin and was introduced into tubes containing calcium chloride. The gain in weight of the tubes was measured every five minutes. The temperatures of the same portions of the skin and in the rectum were determined by the thermo-couple method.

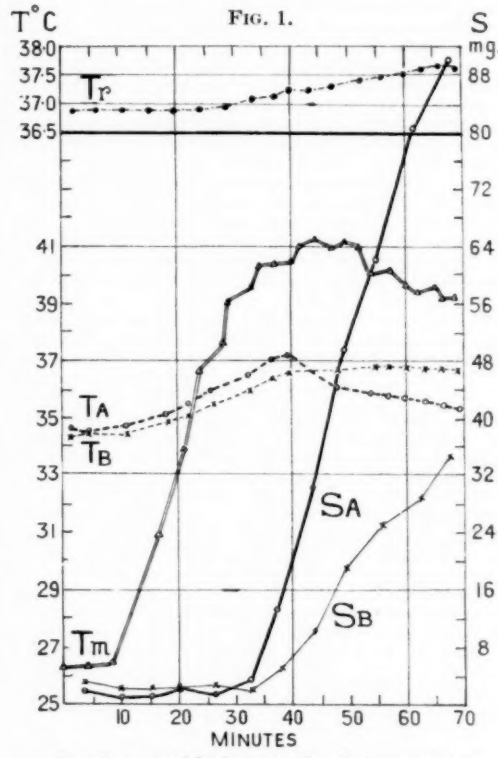
Classification of Sweating in Man.

Using this method, we observed sweating provoked by many different causes. The sweating caused by an increase of room temperature may be regarded as the most common type. Fig. 1 shows one example of such experiments, in which the measurements were made at the chest and the thigh. The tracing in this figure lettered by Tm represents the room temperature; SA, the amount of sweat per 20 sq. cm. per five minutes at the chest; SB, that at the internal surface of the thigh; TA and TB, the skin temperatures measured at the same parts of the skin, and Tr, temperature in the rectum. Sweating begins some 30 minutes after the rise of room temperature and increases rapidly. Though the amount of sweat is very different between the two parts of the skin, the time of the outbreak of sweating is almost the same, and its further changes also coincide. A great number of such experiments were made at many different parts of the skin, but the results were almost the same as shown in the figure.

In another series of experiments local heating of one arm or one leg with dry hot-air baths was used to cause sweating. In this case, sweating also appeared on the whole body surface and was never restricted to the heated portion alone. This may be seen in Fig. 2. In this experiment the left leg only was exposed to a hot-air bath, the temperature of which is indicated by the tracing Tm. Sweating was measured at the corresponding portions on the outer surfaces of both legs, one was heated (SA), and the other was not (SB). Tracings SA and SB show that sweating occurred at the same time and changed in the same manner at these two parts, the only difference between the two being that the amount of sweat was greater on the heated side.

According to these experiments, the sweating caused by heating inevitably appears all over the body surface and never locally, even when the heating is confined to a small portion of the skin surface. But the palms of the hands and the soles of the feet do not conform to this general rule. These parts are those where sweat glands are present most densely, and our experiments proved that, in the state of so-called insensible perspiration, the amount of water discharged from the skin was distinctly larger at these parts than at any other parts of the body surface. It is peculiar, however, that the perspiration from these parts does not increase at all from ordinary thermal causes; in other words, the palms and the soles do not sweat under high atmospheric

FIG. 1.



Sweating caused by increase of room temperature.

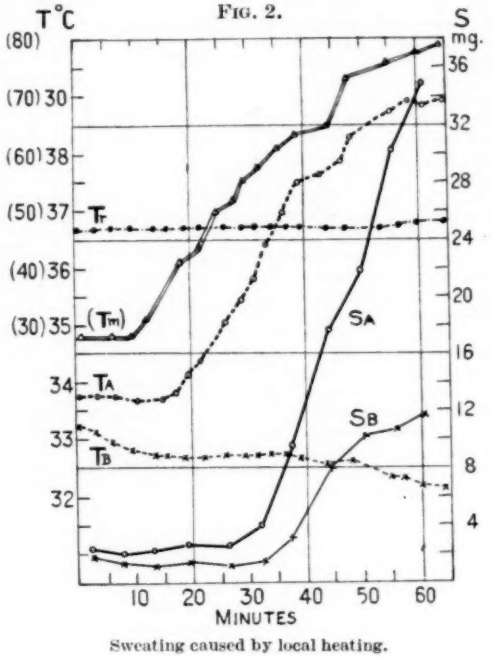
temperature which causes a profuse sweating on all the remaining parts of the body surface. This is shown in Fig. 3. In this experiment sweating was measured on the palm (SA) and on the chest (SB), and the room temperature (Tm) was raised. At the beginning the amount of perspiration was much larger on the palm than on the chest, but the former did not change when the room temperature became high, while a considerable sweating appeared on the chest. Our own experiences agree with the results

* Translation of a lecture given by the author at the fourth annual meeting of the Japanese Association for the Advancement of Science.

of this experiment, because the sweat may run down from the forehead or many other parts of the skin in the summer, but never from the palms or the soles.

This does not mean, however, that the sweat glands of the palms and the soles have no ability to increase their secretion. Though they do not react to common thermal causes, they are able to increase the secretion as a result of many other causal agents. For example, local heating applied to any part of the skin surface, if only it is of an extreme degree, can provoke profuse sweating on the palms and the soles. Besides this, we have also occasionally found that some kinds of pain or some unusual feelings, such as desire to urinate or application of Esmarch's bandage, may be the cause of this sweating. Any intense sensory stimulation seems, therefore, to be able to provoke sweating at these parts.

FIG. 2.

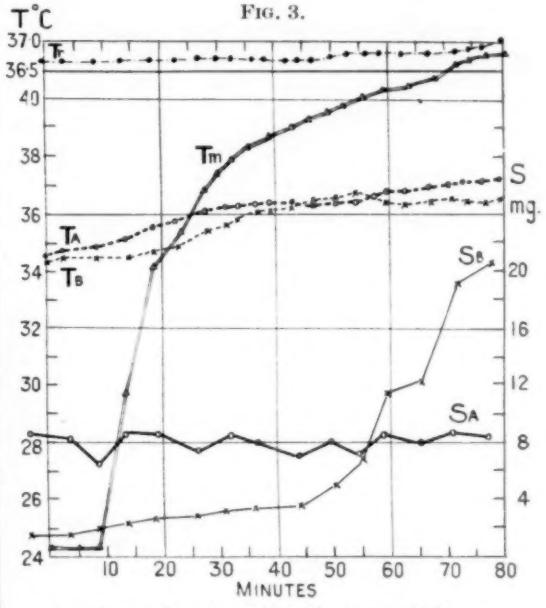


Sweating caused by local heating.

The most adequate cause for this sweating seems, however, to be mental stress. In our experiments mental arithmetic was used to cause mental stress; its influences on the perspiration on different parts of the body surface were observed and very interesting results obtained. Mental arithmetic caused sweating on the palms and the soles only, and not on other parts of the body surface. This is illustrated in Fig. 4 which shows an experiment of the measurement of the perspiration on both palms. During a period of time indicated by M, mental arithmetic was done. Immediately after the beginning of the mental arithmetic the amount of perspiration started to augment; it increased progressively and diminished soon after the mental arithmetic ended. Changes in the amount of sweat on one palm closely paralleled those on the other. Many other similar experiments proved that sweating on the palms and the soles due to any cause is never restricted to one of them but always appears on all four parts. Fig. 5 shows an example of the simultaneous measurement on the palm and on some other part of the skin, in this case the forehead. Tracings show that the palm sweats considerably from mental arithmetic but that no vestige of sweating is found on the forehead. The forehead is well known to be a part of the skin where profuse sweating sometimes occurs in mental stress. This experiment proves that mental arithmetic is not strong enough to cause sweating on this part, but quite sufficient to do so on the palm. All these accounts and many other similar experiments show clearly that the palms and the soles sweat extremely easily as a result of mental stress. A phrase commonly used in the Japanese language is "with sweat in the clenched hands," by which is meant "with suppressed excitement" or "with breathless interest."

With respect to the causation of sweating as well as to the distribution on the body surface, the human sweat glands are, therefore, to be classified clearly into two groups: (1) The sweat glands present on the palms and the soles have the characteristic of permanent secretion† and react with an increased secretion to mental or sensory stimulation but not to rise of temperature in the environment. (2) The sweat glands distributed all over the remaining parts of the body surface show little or none of this permanent secretion or "insensible perspiration." They are not responsive to moderate mental stimulation, but profuse sweating occurs from them when the temperature of the environment rises. One phenomenon is, however, common to these two different sets of sweat glands—i.e., every sweating, whenever it occurs, appears universally over its own respective district and is never confined to any single part in its area. For brevity I will designate the sweating from the former set of sweat glands as "mental or psychical sweating," and that from the latter as "thermal sweating."

FIG. 3.



Sweating on the palm and the chest under high room temperature.

Physiological Significance of Sweating.

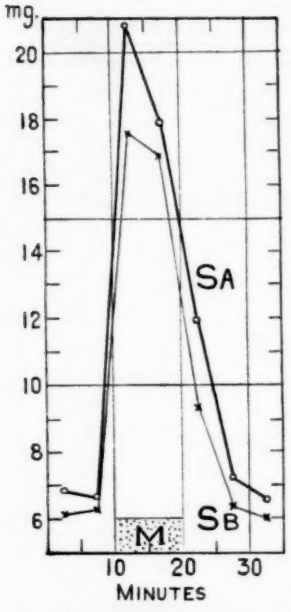
Now arises the question: what is the physiological significance of these two different sweatings? The regional relationship of the thermal sweating on the body surface was observed in the following way. Twenty pieces of filter paper, of exactly the same size and previously weighed, were attached to different parts of the skin, all over the body surface, and hermetically covered with celluloid dishes. The subject was then allowed to sweat profusely in a hot room. Afterwards the papers were taken and again weighed and the gain in weight of each paper was compared. This experiment was made on four men and four women and conformable results were

† Stated in previous papers from this laboratory.

obtained in all. The palm and the sole do not enter into the present discussion, as they are the parts where no thermal sweating appears. With the exception of these two parts, the armpit and the internal femoral region are the parts which sweat least. Generally speaking, the head, the neck, some areas of the anterior and posterior surface of the trunk, and the dorsal region of the hand sweat most. Compared with these parts, sweating on the lateral surface of the trunk and on the greater part of the extremities is remarkably slight.

In addition to this experiment, a simple investigation of sweating was made on the whole body surface on a number of subjects, and we came to the conclusion that the regional distribution of sweating accords closely with the varying necessity of heat elimination from different parts of the body. The following are the reasons for this conclusion: (1) Parts of the skin which have little chance for evaporation of heat sweat least as a rule—e.g., the armpit, the perineal region, the inguinal region, and the internal femoral region. This seems at a glance to be contrary to our daily experiences, because the parts of the skin just mentioned are the very parts which are apt to become wet in hot weather. Experiments have, however, proved that they become wet, not because the sweating is abundant, but because the sweat once discharged evaporates with difficulty. (2) As mentioned above, sweating is, on an average, most abundant on the head, the neck, and the trunk, and much less on the extremities. This seems also to meet the necessity of heat elimination. In the former parts the superficial area is small with respect to the mass; moreover, there are important organs in the cavities and accordingly the necessity of regulation of temperature must be much greater than in the extremities. (3) Sweating is slight on the parts of the skin very rich in subcutaneous fat—e.g., the cheek, the gluteal region, and the mammary region. The cooling effect of evaporation on the whole body may be little at these parts, and it seems reasonable to avoid sweating there. All these circumstances are, therefore, advantageous for the elimination of heat, and the theory that the function of sweating is the regulation of the body temperature seems quite correct for thermal sweating.

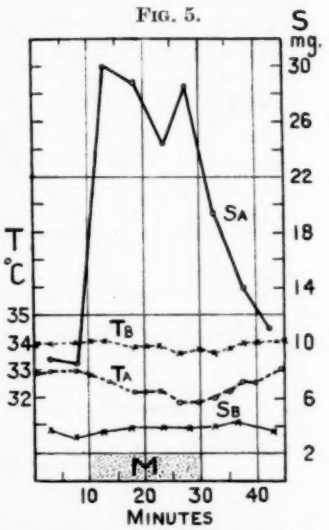
FIG. 4.



Sweating on both palms caused by mental arithmetic.

For mental sweating, however, the theory no longer holds good, because this sweating never appears on exposure of the body to high atmospheric temperature. If this sweating has any physiological significance, it may conceivably be in some relation to mental stress which is its most adequate cause. We have a peculiar habit of moistening the palms of the hands with saliva when muscular exercise is undertaken. This seems to be a habit common to the human race, physiological and not ethnological in origin, because an expression for "spitting on the hands" is found in many different languages. Moistening the surface of the palm would increase the friction between it and the objects with which it comes into contact. Consequently, every sort of muscular work would be facilitated, not only for this physical reason but also for the physiological reason that the sense of touch becomes acute when friction increases. In human beings mental stress is not necessarily accompanied by muscular work, but it is almost inevitably so in animals, because they become excited only for such reasons as self-defence against enemies and battle for the acquisition of food or for the other sex, when more or less muscular exercise is required. It is, therefore, a great advantage for animals that the pads of their feet should become wet through sweating as soon as they are excited. The sweating on the human palms and soles may be regarded as a phenomenon transmitted from animal life. Even in human beings it is not always useless. It is interesting to note that in some languages—e.g., Japanese and Chinese, perhaps in English too—the expression "spitting on the hands" conveys an implication of general physical and mental stress. It is, therefore, highly probable that this sweating has the function of facilitating physical work.

FIG. 5.



Effect of mental arithmetic on the perspiration of the palm (SA) and that of the forehead (SB).

The regional differences of sweating were also investigated on the surface of the palm and the sole by means of the method suggested by Eijkmann. The skin surface was well coloured with an alcoholic solution of fuchsin. A piece of thin Japanese paper was laid on it and kept in good contact with the skin, and then mental arithmetic was given. Drops of sweat discharged from the orifices of the sweat glands dissolve some of the dye and leave red spots on the paper. The density of these imprints corresponds to the distribution of the sweat glands in action, and the degree of colouring is roughly proportional to the amount of sweat discharged. By this method it was found that sweating is, in general, profuse on the parts of the palm and the sole which are protuberant and likely to touch objects on grasping or on walking, and much less on the remaining parts. This regional difference is especially striking between the plantar arch and the remaining parts of the sole, so that the former remains almost white while the latter becomes diffusely red. All these circumstances support the view discussed above about the significance of this sweating.

Sweating in Animals.

The degree of sweating on the pads of the feet varies extremely in different mammals, and this difference seems to be related to their habits. Presumably moistening the pads is not very necessary for animals walking on the ground only, but would be of vital importance to those accustomed to climb trees. It is well known that the pads can sweat freely in the cat and the monkey, and little in the dog and rabbit. The horse sweats most easily on the whole body surface, but the plantar regions of the extremities do not touch the ground, and sweating is not profuse on them. On the contrary, the cat sweats on the pads only and little or practically not at all on the other parts of the body. Therefore, so far as these animals are concerned, the significance of sweating on the pads seems to be the same as that of

mental sweating in man. I am anxious to know if this also applies to other animals, but our present knowledge is too limited to enable us to answer this question.

Many experiments have been performed on the cat from olden times, and the conclusions obtained from the results of these experiments play an essential part in the present knowledge of thermal sweating in man. All these experiments were, however, made under the premiss that sweating in man and in the cat are of the same nature. According to the above discussion, the sweating in the cat seems to be classified with mental sweating, and, if so, this premiss cannot be acknowledged. Judging from commonsense, too, sweating on such small portions as the pads can hardly be regarded as effective for the regulation of the body temperature.

Under ordinary circumstances, the amount of water discharged from the palms and the soles per unit of area is five to ten times as much as that discharged from most of the other parts of the body surface, and this seems to be chiefly due to a permanent secretion of the sweat glands. It has experimentally been proved in this laboratory that the diffusion of moisture through the epidermis is very slow. The outer surface of a thick horny epidermis like that of the palm and the sole might clearly become extremely dry and lose its characteristic flexibility if there were no process for supplying it with moisture. The permanent secretion of sweat on the palm and the sole is intended to meet this necessity. As a matter of fact, the epidermis of these parts sometimes becomes stone-hard on account of the thickening of the skin in a corn, or becomes chapped with dryness in cold weather, probably due to an enormous decrease in the permanent secretion owing to the effect of cold. The constant secretion of the sweat glands of the palms and the soles is, therefore, an important process for the protection of the skin.

Conclusions.

The sweat glands of human beings have three important functions: (1) the regulation of the body temperature; (2) the facilitation of physical work; and (3) the protection of the skin.

A CASE OF CONGENITAL RHABDOMYOMA OF THE HEART.

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RHABDOMYOMATA are rare tumours, but the heart is one of the commoner sites of occurrence. Solitary growths are rarer than multiple. Uehlinger,[3] in 1925, collected 37 cases, 7 solitary and 30 multiple, almost all from German literature. Of these, 25 occurred in the first three years of life and 31 within the first ten years. Tuberous sclerosis in the brain and renal tumours, frequent in the case of the multiple tumours (tuberous sclerosis in 21 of 30 cases, renal tumours in 12 of 30 cases), are not described in the seven cases with solitary nodules, although the brain was not always examined.

The following case occurred in our experience recently.

The patient, a male infant aged 3 months, was brought to hospital on August 8th, 1929. Whilst having his evening feed, he was accidentally struck on the left ankle by the buckle of a strap with which his elder brother, a child of about 4 years of age, was playing. The blow was only a slight, glancing one, just sufficient to cause a superficial scratch about one inch long, but the infant, not unnaturally, immediately commenced to cry vigorously. This crying bout lasted for a few minutes, when there was a sudden change, and the child became very pale and ceased crying. The change was so sinister that the mother wrapped him up in a shawl and at once rushed him off to hospital, where he was found to be dead. During the interval between leaving home and examination at the hospital—possibly some five minutes—the child remained quiet, showed no sign of life, and was presumably already dead. At no time during the attack did he appear to have any respiratory difficulty, and there was no evidence of cyanosis.

The child had always been regarded as healthy and normal. He had never suffered from fits or convulsions, and there was certainly nothing to suggest that he was other than what he appeared to be, a normal healthy child in every respect.

Post-mortem Examination.

The body was well-developed and well-nourished. No organ save the heart showed any significant alteration. In particular, no sclerosis or other alteration was found in the brain, and no tumour nodules in the kidneys or elsewhere. The heart was very much enlarged, weighing 130 g. as against a weight of about 25 g. for the normal heart at the same age. The chief enlargement, as the heart lay in situ, was to the left and slightly downwards. Further examination showed a large ovoid tumour in the lateral wall of the left ventricle, displacing the cardiac chambers to the right and upwards. The cavity of the left ventricle was dilated, but not to a marked degree. The tumour comprised by far the greater bulk and weight of the heart, and measured 3 in. by 2¼ in. on section. It was firm, pale, almost white and fibrous-looking, and the cut surface showed distinct, coarse fasciculation throughout. A thinned-out but complete layer of ventricular muscle intervened between the tumour and both endocardial and epicardial surfaces, but this was so thin that the pallor of the underlying tumour tissue could be seen from both surfaces, especially the epicardial. Although clearly demarcated from the cardiac muscle, the tumour had no definite capsule and its contour was slightly irregular. The gross appearance was very like that of a fibroma.

FIG. 1. FIG. 2.

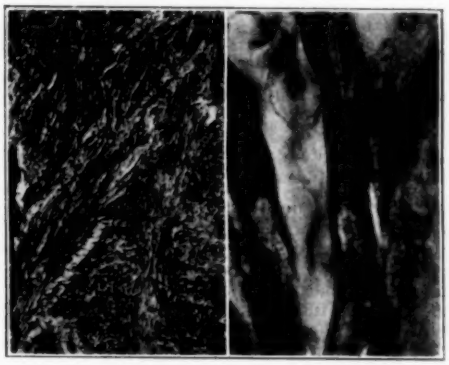

FIG. 1.—Cardiac tumour showing fasciculation. (× 50.)
FIG. 2.—The same. (× 900.)

Microscopic Examination.

The tumour was composed throughout of interlacing bundles, some seen in cross section, others in tangential or intermediate planes of section. (Fig. 1.) Each bundle was composed of striated muscle of the cardiac type, and within the bundle each small group of muscle-fibres was separated from its neighbours by numerous coarse interlacing fibres of collagenous connective tissue. Most of the connective tissue fibres ran in the same direction as the muscle-fibres of the bundle, but a considerable number branched off to run obliquely across the muscle-fibres and interlace with neighbouring longitudinal fibres of connective tissue. Thus each bundle was composed of muscle-fibres and connective tissue running in the same direction, but with the fibres of the latter also anastomosing across the intervening muscle and so bracing the whole bundle together. The greater actual bulk was connective tissue. To this, however, very few indeed of the nuclei present were related, and such fibroblastic nuclei, small, elongated, narrow, and darkly staining, were easily differentiated from the others. The remaining nuclei were all muscle nuclei, most of them well-differentiated and closely

resembling the adult cardiac muscle-cell nucleus. A minority were undifferentiated myoblastic nuclei. The fibres in which the muscle nuclei lay showed in most cases distinct regular cross and longitudinal striation (iron hæmatoxylin; phosphotungstic acid hæmatoxylin; hæmalum and picrofuchsin). (Fig. 2.) It was sometimes possible to identify alternate light and dark bands of cross striation. Here and there, however, small specially cellular areas were encountered. It was mainly in such areas that the nuclei were larger, sometimes much larger, oval or rounded, and evidently myoblastic. The cytoplasm was of irregular form and extent, being sometimes syncytial and vacuolated. It stained as did the cytoplasm of the obvious muscle with the various stains used, but only here and there did it show limited patches of regular striation. Elsewhere it was clear, or contained granules staining similarly to the constituent granules of the regular cross striations, but either completely without arrangement or forming irregular and incomplete lines of dots.

The vessels of the tumour were well-formed. No other types of tissue were discoverable in it. There was no appreciable difference between the appearance at the centre and that at the periphery of the tumour, and the ratio of muscle to connective tissue appeared roughly uniform throughout.

Commentary.

With the presence of this tumour in the heart the child was living on the edge of a precipice, and any sudden exertion or strain would be sufficient to bring about a catastrophe. Nearly all the cases reported by Uehlinger [3] occurred in children, probably because the patient is seldom spared until adult life. However, the case reported by Bradley and Maxwell,[1] a primary rhabdomyosarcoma of the heart, occurred in an adult, 62 years of age. As it happened, the precipitating factor in this case was the bout of crying, brought on by the slight injury received. The extra strain put on the heart, with the increase in blood pressure, was enough to overtax an organ already burdened by the presence of this neoplasm. It is interesting to note that at no time previously had the neoplasm given any signs of its presence, although it is not unreasonable to suppose that the child must have indulged in bouts of crying equally as vigorous as this one during its three months of life. None of the signs referable to the heart which have been reported in neoplasms of the heart (Perlstein [2])—e.g., œdema, cyanosis, hæmoptysis, or ascites—were present in this case.

While the naked-eye fibrous texture of this tumour was explained on microscopic examination by the presence of an abundance of connective tissue, it was also evident that the connective tissue was not the active cellular element but was rather an abundant framework supporting the essential element of striated muscle. This muscle, while for the most part well differentiated, was here and there myoblastic, and the conclusion that the tumour is a solitary congenital rhabdomyoma of the heart seems irresistible.

In two respects, however, the structure described differs rather strikingly from the usual description of rhabdomyomata of the heart.

1. The structure usually found is more myoblastic and less differentiated than that seen here. There is also a much more extensive vacuolation and an even greater cellularity. This striking vacuolation has been described as invariable (Wolbach [4] and others). While single oil-immersion fields can be found in the present tumour presenting in parts the usual myoblastic and vacuolated appearances, they are few and far between.

2. Accompanying connective tissue seems to be more abundant here than ordinarily, and the tumour is therefore firmer and paler than is usually found.

We wish to tender our acknowledgments to Mr. W. Nelson for taking the microphotographs here reproduced.

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Clinical and Laboratory Notes.

A CASE OF MULTIPLE CONGENITAL SKELETAL DEFORMITIES

CAUSING CONGENITAL SCOLIOSIS.

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CASES of congenital scoliosis occur in otherwise normal infants, and are due to maldevelopment of the vertebræ or of the ribs, and are associated with elevation of the scapula, outgrowing hip and changes in the lateral thoracic wall. The following is a brief description of such a case.

A girl, aged 6, was noticed to have a mole on her back at birth, which was normal, and six months later her mother observed that her back was crooked. This condition was treated by a leather jacket worn during the day. She is a bright intelligent active child, with a marked scoliosis in the thoracic region, the convexity being towards the left, the greatest deviation from the normal being at the level of the sixth thoracic vertebra, where there is a spina bifida occulta associated with a hairy mole (Fig. 1). There is compensatory scoliosis in the lumbar and to a minor degree in the cervical regions, and marked kyphosis at the level of the ninth and tenth thoracic vertebræ with compensatory lordosis in the lumbar region. Marked posterior bulging of the ribs is evident on the right side with but little compensatory bulging of the left rib anteriorly, while the left side of the chest is half an inch larger in circumference than the right at the level of the angle of the scapula. There is very little movement in the thoracic vertebræ, even when the patient is suspended by her arms from a horizontal bar, but full movement is possible in the lumbar and cervical regions.

The head is held with about five degrees lateral flexion; there are no ocular symptoms. A loose fold of skin stretches from a point posteriorly to the right mastoid process to the right acromion process. The right shoulder is held at a higher level than the left, the right scapula being rotated so that the angle lies only half an inch from the spinous processes as compared with a distance of two and a half inches on the left side.

FIG. 1.

Photograph showing site of spina bifida occulta and hairy mole.

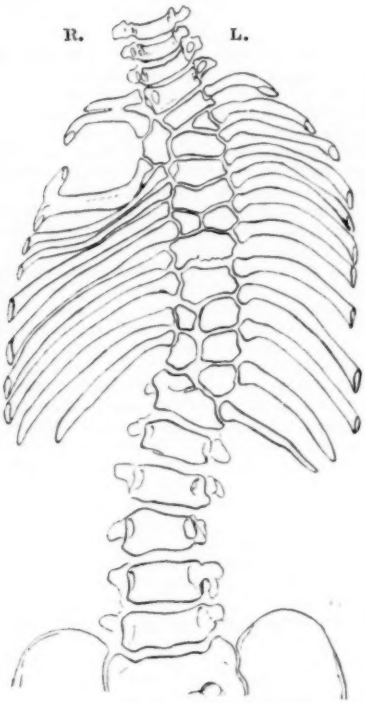
The pelvis is very slightly tilted, the left gluteal fold being slightly higher than the right, and being more marked. The only difference in the legs is a slight genu valgum on the left side. A pelvic examination has not been made.

X ray examination shows the causes of the scoliosis which is due to non-fusion of the lateral halves of the body of the second thoracic vertebra, the right half being displaced laterally and articulating with the second rib, which after fusion with the third rib for a short distance becomes bifid at the angle, and also to suppression of the right half of the eleventh thoracic vertebra. There is also non-union of the lateral halves of the sixth thoracic vertebra—the site of the spina bifida occulta—and of the ninth and tenth thoracic vertebræ. The eleventh and twelfth ribs are absent on the right side. A tracing from the radiogram is shown in Fig. 2. A plaster jacket has been made for the patient to lie in whilst at rest, in order to check the increasing deformity and in the hope of partially correcting it by inserting suitable padding. A leather spinal support is worn during the day. She has been given massage for the fold of skin of the neck and scoliosis exercises, but it

is doubtful if the latter will have any beneficial effect on the deformity.

The striking features of the case are the number of errors of maldevelopment which occur in the thoracic area—the cervical and lumbar areas being normal except for the compensatory curves—and the unusual position of the spina bifida occulta. This case emphasises the importance of X ray examination in all cases of scoliosis in young children in order to discover the causes of the condition, which may be due to supernumerary deficient or fused half vertebræ, or synostosis of the ribs, all arising out of the maldevelopment of the skeletal axial skeleton, and in order to prevent the increase of the deformity during the active days of childhood.

FIG. 2.



Tracing from radiogram.

I am indebted to Mr. C. P. G. Wakeley, under whose care this case was treated at the Belgrave Hospital for Children, for permission to publish these notes.

References.—Wakeley, C. P. G.: Jour. of Anatomy, 1923, lvii., 147. Willis, T. A.: Amer. Jour. of Surgery, 1929, vi., 163.

A NEW TREATMENT FOR ARTERIAL CALCIFICATION.

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THE usual routine treatment and therapy for arterio-sclerotic patients always seemed to me so inadequate that I have employed a course of treatment not generally known which has proved so successful that I am desirous of placing this communication before my British confrères. Arterio-sclerosis is a physiological accompanimest of old age and may be hereditary. The commonest causes are mental excitement and a diet too rich in proteins, combined with insufficient physical exercise, especially in middle age. Contributory causes are nicotine, alcohol, and infections. Severe physical exertion with an insufficiently nutritive diet may lead to the same result. Where there is deficient toxin elimination by the intestines and skin the kidneys become overburdened and nephrosclerosis may occur. The well-known changes in the intima and media of the arteries cannot account for the whole of the clinical picture. Many authors report that certain drugs, such as iodine and silica, mitigate the troublesome subjective symptoms (vertigo, headaches, insomnia, angina pectoris), but the same auscultatory signs remain. This coincides with my own experience. All these symptoms cannot be wholly due to high blood pressure, for they frequently disappear before the blood pressure has decreased, which proves that the pathologico-anatomical changes detectable by auscultation and frequently by X rays may exist without any subjective disturbances and that there must be other causes which require special remedial treatment.

It is probably correct to regard certain symptoms of arterio-sclerosis as splanchnic crises due to calcification of the nutritive vessels. If the demands on it are moderate the blood stream flowing through the narrowed arteries suffices, but otherwise its insufficiency causes crises. The clinical picture is obviously highly complicated, presenting many points of attack for therapy, and though there is little hope that the anatomically changed arteries will return to normal conditions there are prophylactic possibilities and the probability of retarding progress and of rendering the patient's condition endurable.

The skin of arterio-sclerotics, particularly the skin of the face and extremities, supplies an index to many of the symptoms. The extremities are cold and livid as a result of derangement of the heat regulation, while the hue of the nose is typical of the aged face, small arteries show on the nasal alæ and cheeks, and the skin becomes inelastic, furrowed, and dry. Another type, most frequently occurring in the obese and usually of very long standing, is the markedly pale, pasty, dry skin. These individuals may be subject to the same disturbances of heat regulation as the first type and attacks of cardiac spasm are frequently ushered in by the appearance of redness in Head's "cardiac region." All these symptoms are, no doubt, due to the same causes as the arterial calcification and partly to disturbances of internal secretion.

By an extensive series of tests made in the department of balneology and physical therapy at Prague University we were able to demonstrate that after thermal and mechanical (and also electro-therapeutic) treatment, blood pressure was raised very temporarily and by no more than the ordinary daily variations, and fell again when the skin reaction set in. There is no danger in the increase of blood pressure as is proved by our treatment of several thousand cases of arterial calcification, without a single hæmorrhage. The skin as well as the arterial calcification can be influenced hydropathically. The patient must react normally, and if he fails to do so the process must immediately be modified to suit his condition. The heat regulation usually improves after this treatment. It is possible by certain procedures to provoke hyperæmia or anæmia of the skin and the general circulation and thus the heart will be greatly relieved. This is often of more value than cardiac and vascular medication. Hydrotherapy is also capable of affecting the internal organs via the skin. The method described forms the basis of the treatment and can be altered to meet individual cases.

Technique.

The patient is well brushed in a warm (35°–36° C.) half bath for 10–20 minutes and then receives a good douching with a fan-shaped douche from a distanceof 6–7 ft., at first for two to three minutes with water at 35° C., then with water at 25° C. for one to two minutes. These douches are repeated two or three times. At first they are usually applied to the back and lower extremities and later over the whole body. The patient is thoroughly dried, well wrapped up, and then allowed to lie down for at least half an hour.

Some patients react badly to the heart stimulation; it deranges the body heat regulation; they tend to shiver; the isothermic water seems cold, and after the procedure they cannot regain warmth; and skin reaction does not take place. For these we begin with half baths, usually at 38° C. for not more than 10 minutes; the brushing must be energetic. We decided on 38°–40° C. for the douches, after which the patient must be well rubbed until the skin becomes red and the feeling of cold vanishes.

Should the patient be very delicate or suffer from hypotension, myocarditis, or cardiac debility, artificial sunlight

is applied instead of the baths, and we only resort to hydrotherapy when the condition has improved.

This treatment has given highly beneficial results in several thousand cases. The subjective symptoms disappear, the blood pressure decreases, and the skin assumes its normal appearance. The auscultatory symptoms and X ray picture, however, mostly remain unchanged. Painful sensations in the cardiac region are treated by anionisation. If the patient suffers from spasms we bring into use the "tonisator," an apparatus devised by Dr. Ebel of Vienna by which a faradic current is varied in intensity and frequency by means of a clockwork mechanism without producing any discomfort.

Drug Treatment.

Silica has long been used in French therapy and a beneficial effect on arterial calcification claimed in cases of tuberculosis. Intravenous injection brings with it the danger that some of the solution may find its way into the cellular tissues and set up painful reaction. I therefore determined to try silica given by the mouth in colloidal form. Many authors assert that silica deficiency in the organism is due to bad intestinal resorption. To prove this I decided to combine the silica with an extract of *Drosera*—the common *Drosera rotundifolia*. Modern pharmacology gives us little information about this plant, but since it is an insectivorous plant it must contain ferments which not only digest proteins but also chitin. The researches of Stocklasa have shown that the ferment of the *Drosera* is a far more efficient proteolytic agent than pepsin; and that *Drosera* possesses a keratolytic ferment and an iodoxydase. The extract had therefore to be prepared in such a manner that all the ferments remained intact. For convenience of administration the drugs were prepared in tablet form under the name of "Drosil." I found that its action was surprisingly efficient in overcoming the subjective troubles of arterio-sclerosis (vertigo, confusion, insomnia, cardiac oppression) and in the alleviation of the symptoms of cardiac debility such as dyspnœa, articular œdema, and hypostasis. In cases of hypertonia a slow but lasting improvement took place. Two of the tablets are taken thrice daily; they may be dissolved in hot water. The treatment lasts for four or five weeks and during this period the patient's condition usually shows a marked improvement. An interval should follow until the old symptoms reappear; this interval may last for weeks or months.

It is advisable to combine this therapy with hydrotherapy and then to continue the hydrotherapy. The diet should be light with little protein. Open-air exercise is helpful. It may be that the *Drosera* ferments assist the adsorption of the silica and so supply the silica deficiency in the organism—a substitution therapy. There is also a possibility that the silica which is resorbed in a form convenient to the organism may act as a catalyst, effective as a remedy for harmful effects, and at the same time as a retardive of colloidal changes. It is valuable for the musculature and especially the heart muscle. Stocklasa recently discovered a lipolytic ferment in the *Drosera*, and I am experimenting with this and with a combination of silica, *Drosera*, and extracts of the thyroid and sexual glands.

SHROPSHIRE ORTHOPÆDIC HOSPITAL.—Last year this institution treated a total of 4720 patients and, after spending £48,541, had a credit balance of £30. The hospital, which is at Oswestry, has 33 clinics scattered over eight counties. A cinema has been installed, and films are shown on two nights a week to the patients and on another to the staff and those who are being trained at the Derwen Cripples' Training College, which is close to the hospital. The after-care scheme now embraces an almost equal proportion of preventive work. The temporary buildings erected 16 years ago are very costly to keep in repair, and it is proposed to begin the work of reconstruction by providing a new nurses' home.

Reviews and Notices of Books.

ANATOMY.

Lehrbuch der Systematischen Anatomie. By Prof. Dr. JULIUS TANDLER, Director of the First Anatomical Institute, Vienna. Vols. I.–IV. Leipzig: F. C. W. Vogel. 1926–29.

IN 1912 Prof. Tandler, of the First Anatomical Institute in Vienna, began to write his magnum opus, but the war and its after-effects interfered with this work as with that of many others, and it was not before the latter part of last year that the last of his four volumes appeared. The standing of the author, and his unimpeachable authority when writing on his subject, make the completion of this work a matter of considerable interest throughout the anatomical world. It will rank among the leading text-books in the German tongue.

The first volume deals with the skeleton, joints, and muscles, the second with the viscera, the third with the circulatory system, while the last and largest volume is concerned with the central nervous system, nerves, and special sense organs. The accounts given of all these parts are, of course, full and accurate, but the outstanding feature which impresses one throughout is the simplicity and clearness of description. This is particularly apparent in the consideration of the central nervous system, where the mental picture called up is hardly bettered in any text-book with which we are acquainted. The almost complete absence of embryological reference, except as the necessary foundation of the nervous system, is the more striking because of Prof. Tandler's eminence in that branch of anatomy. In the earlier advertisements of the book it was stated that a final part was planned including, among other matters, a short account of development, but the author makes no mention of this in the foreword to his fourth volume. The illustrations, of which there are more than 1200 in all, are beautiful as well as useful.

Prof. Tandler deserves the congratulations as well as the thanks of his colleagues in all countries for this great book, which is weighty without being heavy, and is stamped with his personality in a way which distinguishes it from the compilations which now form the basis of many modern text-books.

A Text-book of Anatomy and Physiology. Third edition. By JESSE F. WILLIAMS, M.D., Professor of Physical Education, Teachers College, Columbia University, New York City. London: W. B. Saunders Company. 1929. Pp. 578. 12*s.* 6*d.*

THIS book, evidently in demand, is intended for students of the practical arts—to use its author's words—such arts comprising nursing, physical education, physiotherapy, occupational therapy, and household crafts. We imagine that it is rather intended as an aid and stimulus to the teacher than for the immediate study of the students themselves, but in any case it is one of the best books of its kind that we have seen. This edition has been revised in many ways, and a large glossary has been added. There is not, perhaps, the same demand for books of this class in England. It is not full enough, of course, for students of medicine as their only text-book, but many of these students would learn a good deal if they studied it after they have done their intermediate courses. It is very well illustrated and produced.

PATHFINDERS IN MEDICINE.

Second edition. By VICTOR ROBINSON, M.D. New York: Medical Life Press. 1929. Pp. 810. $10.0.

Dr. Victor Robinson, in this second edition of his work, has much increased both its scope and value. The volume now consists of a series of 30 essays

written during the past 20 years, which have been published separately in various appropriate journals or have found their way into the archives of medical societies, and their collation adds to their individual merits and makes up a useful book of reference. The pathfinders, whose work as pioneers in medicine is described, are as follows: Galen, Aretæus, *Rhazes, Paracelsus, Servetus, *Vesalius, Paré, *Descartes, *Malpighi, John Hunter, Edward Jenner, Henry Cavendish, Scheele, Berzelius, *S. Guthrie, Laennec, * Purkinje, Schleiden-Schwann, *Henle, Darwin, J. Y. Simpson, *Duchenne, *Bernard, *Hebra, Semmelweis, *Elizabeth Blackwell, *Pasteur, *Koch, *Metchnikoff, and *Pavloff. The names in this distinctly capricious list which are marked with an asterisk are the pathfinders whose lives comprised the first edition of the book, the remaining 15 names denote the subjects added for the purpose of this issue. All the essays are written in an extremely readable fashion, many of them are adequately illustrated, and the material often owes both its detail and its accuracy to the assiduous manner in which Dr. Robinson has approached relatives, descendants, and recognised authorities for information and criticism. This is particularly obvious in the longest article, that devoted to the life of Henle; it includes four portraits of Henle himself and portraits of his wife, mother, sister, and daughter, and several facsimiles of his handwriting. The chapter would make a small book in itself and will be read with interest by those who know no German, for Henle is not frequently brought to the attention of English readers.

This is a handy work of reference and in many cases the biographies, though individually brief, will be found to need little supplement in essentials from larger lives of the various pathfinders.

BIRTH CONTROL ON TRIAL.

By LELLA SECOR FLORENCE. Foreword by Sir HUMPHRY ROLLESTON, Bt., K.C.B. Introduction by F. H. A. MARSHALL, F.R.S. London: George Allen and Unwin, Ltd. 1930. Pp. 160. 5*s*.

THIS book provides a detailed and disinterested survey of contemporary contraceptive methods. Mrs. Florence has followed up, with a scrupulous perseverance that deserves much praise, the first 300 women who attended the Cambridge Women's Welfare Centre for advice on birth control. Of these 300 patients, Mrs. Florence failed to trace only 25. A further 28, for one reason or another, were never given advice on birth control. Records are therefore available of 247 women. Of these women, 75 found that the contraceptive method taught them failed in one way or another. Three of this number experienced two successive failures, with the result that 78 pregnancies resulted. Another 80 patients for various reasons gave up the method that they had been instructed to use at the clinic. Out of 247 patients, therefore, no less than 155 found that the pessary or the sheath was unsatisfactory. These cases are analysed with some care in the book, which should prove of great value to medical men who want an impartial account of the efficacy and practicability of the various methods of birth prevention.

Of the many interesting points brought out by the survey, three deserve notice. The first is that the experience of the Cambridge clinic caused the medical officers to place more and more reliance on the sheath as the most dependable method for those couples who do not find it æsthetically objectionable and in which the husband can be relied upon to use it. The sheath has received an undue amount of condemnation by writers on contraception. The Cambridge clinic uses with success an article that costs sixpence. These are frequently employed for three or four months, and a case is on record of a man who used his without mishap for three years consecutively. A second point which the author frequently stresses throughout the book is the need for further research. From the chapter dealing with successful cases, it is obvious that the clinic in Cambridge performs a highly valuable function. To argue from the high proportion of failures that this clinic, and the other birth control clinics, are useless would reveal a lack of understanding of the needs of working-class women, many of whom are grateful for knowledge which, if it fails to prevent childbirth, at any rate enables them to prolong the intervals between childbirths. The imperfections of existing methods should move us not to despair, but to seek to find better methods. A third point that deserves notice is the prevalence and unreliability of coitus interruptus. Of 265 patients, 118 had practised this method before coming to the clinic, and in these cases it had failed to the extent that there resulted no less than 409 unwanted pregnancies.

Though the numbers on which this study is based are small, the follow-up has been unusually thorough. The author writes with an impartiality and restraint unusual among advocates of birth control.

INFECTIOUS DISEASES.

Acute Infectious Diseases. A Handbook for Practitioners and Students. Second edition, revised and enlarged. By J. D. ROLLESTON, M.D. Oxf., M.R.C.P. Lond., Medical Superintendent, Western Hospital, S.W. London: William Heinemann (Medical Books), Ltd. 1929. Pp. 419. 15*s*.

THE first edition of this excellent book which appeared over four and a half years ago was based on the author's personal experience and on a study of the literature of the commoner acute infectious diseases. In this second edition new work has been incorporated, the principal additions and alterations being in the chapters on diphtheria, typhoid fever, scarlet fever, measles, and vaccinia. References to the literature of the various diseases has been brought well up to date. Immunisation against diphtheria and scarlet fever, and also the attempts to immunise young children against measles, by means of convalescent serum and whole blood, including virulent whole blood, are well described. The measles problem is undoubtedly a difficult one in large cities where hospital accommodation is inadequate; immunisation may well help to reduce the high mortality from measles associated with overcrowding in congested slum areas. Since patients suffering from influenza, puerperal fever, anterior poliomyelitis, and encephalitis lethargica are nowadays admitted to many fever hospitals, chapters on these diseases might usefully have been added. Dr. Rolleston's views on treatment are of interest. Many physicians still adopt the practice of giving alcoholic stimulants in acute infectious fevers. Dr. Rolleston gave up this practice many years ago, and holds that there is no justification for the routine administration of alcohol even in diphtheria. No illustrations are provided. The average student undoubtedly learns much from good pictures of rashes, while even temperature charts help him to remember the characteristic course of the various exanthemata. Practitioners who have already a working knowledge of the infectious diseases need neither of these aids, and will find here just what they require, as well as numerous references to original communications.

Infectious Diseases for Nurses. By EUSTACE THORP, M.B., Ch.B., D.P.H., Deputy Medical Officer of Health, Sunderland. London: Baillière; Tindall and Cox. 1929. Pp. 131. 5*s*.

THIS little book is primarily designed for nurses and is based on a series of lectures to them. Dr. Thorp obviously agrees with the teaching of the best authorities on fevers, and the book contains valuable information put in familiar language. He deals with all the common infectious diseases and, in addition, provides brief chapters on such diseases as undulant fever; encephalitis lethargica; anterior poliomyelitis; tuberculosis, including tuberculous

meningitis and surgical tuberculosis, &c.; ophthalmia neonatorum; puerperal fever and venereal disease. A good account of bed isolation is included with detailed instructions for barrier nursing. Dr. Thorp divides the stages of laryngeal diphtheria in two ways, giving first quite a satisfactory classification and then a second one—which he prefers; this duplication is likely to confuse nurses. On the whole, however, this is a good book and should become popular.

GYNÆCOLOGY.

Fourth edition. By BROOKE M. ANSPACH, M.D., Professor of Gynecology, Jefferson Medical College, Philadelphia. London: J. B. Lippincott Company. 1929. Pp. 752. 42*s*.

THIS is now one of the most popular American text-books on gynæcology, having reached four editions in eight years. A certain amount of new matter has been added but no great changes have been made in this edition. Unlike the authors of most recent American text-books, Prof. Anspach does not dismiss the radical operation for carcinoma of the cervix as an obsolete operation. It is described in detail, though it is definitely held to be inferior to radium in the treatment of carcinoma of the cervix. It is curious that the results obtained with radium at such centres as Stockholm and Paris are not mentioned even among the references to original publications which round off each chapter. Of particular interest are the accounts of recent work on sterility and of the uses of electricity in gynæcology.

LABORATORY METHODS OF THE UNITED STATES ARMY.

Edited by CHARLES F. CRAIG, M.D., Colonel: Medical Corps, United States Army. Philadelphia, Lea and Febiger. 1929. Pp. 696. $3.50.

THIS book is written by laboratory workers for their kind, being designed for the guidance of workers in the laboratories of the United States Army Medical Corps. It contains descriptions of all the procedures used in these laboratories, but no details about interpretation of findings; the descriptions are clear and concise, and the editor has had the good judgment to include in every instance an account of only one well-tried procedure for one particular purpose. In so doing he has made a step towards the much-needed standardisation of laboratory procedures. Being designed for an Army Service, the book deals not only with the ordinary laboratory procedures of use in general medicine, but also with the examination of water, alcohol, foodstuffs, and also of veterinary specimens. These sections will make the book particularly useful to the isolated laboratory worker, who is only occasionally called upon to deal with work of this sort.

THE SOYA BEAN AND THE NEW SOYA FLOUR.

By C. J. FERRÉE. Revised translation from the Dutch by C. J. FERRÉE and J. T. TASSAUD. London: William Heinemann (Medical Books), Ltd. 1929. Pp. 79. 6*s*.

A FULL account is here given of the Soya bean, its history, cultivation, and nutritive properties. As one reads one feels that such a nonpareil among vegetables has indeed suffered neglect for too long, but the cause of this neglect is to be found in the extreme difficulty of rendering it palatable for Western consumption. The object of the book reveals itself in the statement that this difficulty of unpalatability has been overcome by means of a secret process discovered by a Hungarian, Dr. Laszlo Berczeller. There is no doubt that the Soya bean has extraordinary nutritive properties, which if they could be applied to supplement dietaries in Europe and in Asia, particularly in British India, might convey great benefit. This book should not, however, be mistaken for a scientific manual on the subject.

ULTRA-VIOLET LIGHT AND VITAMIN D IN NUTRITION.

By KATHARINE BLUNT, President of Connecticut College; formerly Chairman of the Department of Home Economics, University of Chicago; and RUTH COWAN, Instructor in Home Economics in the University of Chicago. Chicago: University of Chicago Press. 1930. Pp. 229. 11*s*. 6*d*.

THE object of the book is to place at the disposal of those whom it should chiefly concern—i.e., physicians, dentists, teachers of nutrition, and parents—a general survey of the remarkable progress which has recently been made in our knowledge of vitamin D and ultra-violet light and their relation to the calcium and phosphorus metabolism of the body. It covers the field well and most accurately, the exposition being clear and not too technical for the first three categories of persons named, but for the average parent it would make difficult reading.

The book is naturally built up largely on Trans-atlantic work, and to British readers the occasional lapses into colloquial style will be unwelcome. However, fair credit is given to researches made in Europe, and in general the handbook can be warmly recommended.

JOURNALS.

INDIAN JOURNAL OF MEDICAL RESEARCH.—The issue of January, 1930, contains 34 papers covering a wide range of research work in India. T. A. Hughes and D. L. Shrivastava contribute two papers on the enlarged malarial spleen, and J. A. Sinton, S. Smith, and D. Pottinger record the therapeutic effects of plasmoquine and quinine in malaria. In a separate publication Sinton details his observations on the parosan and dimeplasmine treatment of the same disease. The dietetic deficiencies receive much attention. R. McCarrison compares the dietetic value of whole wheat and white bread; the latter is not recommended as a staple article of diet owing to its lower nutritive value and deficient content in vitamin B. Another paper by the same author deals with the effects on the tracheal mucous membrane and on the thyroid gland of food poor in vitamin A. C. Newcomb investigated the water content of the myocardium in beri-beri columbarum, and found that the enlargement of the heart was not explained by water retention. D. C. Wilson and her colleagues contribute two papers on osteomalacia (late rickets) in India, the first dealing with the blood picture and the second with ætiological considerations. A consistent lack of vitamin D and deficient sunlight were the chief factors implicated, but an excess of cereals in the diet contributed to some degree. The incidence of rickets and dental caries in school-children forms the basis of another paper. L. Wills and M. M. Mehta issue a preliminary report on pernicious anæmia of pregnancy; they found the gastric secretion of hydrochloric acid practically normal, the indirect van den Bergh readings low, and the blood picture megalocytic in type. The significance of diets poor in vitamins A and C are discussed. A. C. Ukil contribute two papers on tuberculosis in India. The first deals with its epidemiological and pathological aspects, the second with the rôle of secondary bacterial infection in phthisis. In kala-azar, L. E. Napier and C. R. Das Gupta demonstrate the value of a provocative injection of pentavalent antimony in diagnosis, while elsewhere R. B. Lloyd, L. E. Napier, and G. C. Mitra show that this disease in the absence of syphilis does not give rise to a positive Wassermann reaction. W. J. Webster and G. D. Chitre describe a simple method of rearing laboratory-bred rat fleas and also recorded the successful transmission of plague by *X. brasiliensis*. Several other important entomological contributions are made, the most striking being the demonstration by H. E. Shortt and his collaborators of the presence of *Leishmania donovani* in wild *Phlebotomus argentipes*. The issue closes with an interim report on the bacteriophage inquiry conducted under the auspices of the Indian Research Fund Association.

THE LANCET.

LONDON: SATURDAY, APRIL 26, 1930.

HOSPITAL POLICY.

A SUPPLEMENT to last week's issue of the *British Medical Journal* contains a detailed account of the revised hospital policy of the British Medical Association—that is to say, that the document provides an orderly review of the social changes in recent years as reflected generally in hospital management and conduct. Hence it makes informing reading alike for medical staffs of hospitals, private practitioners, the patients, and the public. The views of the Association with regard to hospital accommodation are set out with typical schemes for the organisation of two main types of institution—namely, the voluntary and the municipal, or those which now have come under the authority of County Councils through the recent Local Government Act. In both cases the Association is concerned especially to see that certain fundamental conditions are met, such as the limitation of hospital accommodation to those patients where medical service in the best interests of the patient can be given only in an institution, and an arrangement for the medical staffing in accordance with principles approved by the medical profession.

A further condition of right hospital policy is also indicated in the opinion given that the normal method for the admission of patients should be on the recommendation of a medical practitioner. Of recent years this right way of filling the beds has been more generally adopted, and the system by which subscribers, in recognition of their generosity, could nominate candidates for reception in crowded institutions has fallen into discredit. This system was always looked at askance by those who had the best interests of the voluntary hospitals at heart, but it was the common view of those who had the financial management of the charities in their hands that its maintenance was valuable for opening the public purse, and in deference to this business attitude it was persevered in till lately. But under the abuse of hospital letters, especially at certain of the metropolitan hospitals, the practitioner was much discouraged from sending patients for hospital treatment in those earlier stages when that treatment would have been most beneficial; and when the patient was so ill that entrance to the hospital could hardly be refused, the practitioner felt that it was the desperate need of the subject, and not any prevision of his own, that had secured, and possibly secured too late, the ministrations that were needed. This situation should no longer arise, and probably the cases that find their way into the wards in this miserable manner are now much fewer, while medical service under the National Insurance Act provides, as a part of the routine performance of the practitioner's duty, the recommendation of cases fitted in his judgment for hospital treatment to authorities who, on their side, recognise that to welcome such patients as far as possible is to give development to one of the most important implications of the Act. As we all know, the waiting-lists at most of our general hospitals are pathetically long, and the main reason for this is that a vastly larger number of persons, qualified by sickness and suffering for institutional care, are detected than was formerly the case. These persons constitute the sad crowd with which the new municipal hospitals will have to deal in part, as and when they are able to meet the responsibility, while the number of beds which we may soon see opened will enable some method of classification to be arrived at by which certain centres will be selected for the relief of particular groups of cases. Such a method should provide great opportunities for teaching, when this mine of material can be fruitfully worked through the offices of capable teachers, and in this way a further ideal can be realised—which also is emphasised in the statement of the Association—that as far as possible all hospitals should be available for purposes of medical education.

The essence of the conduct of voluntary hospitals has been the independence inherent in their management. This has been insisted upon over and over again in these columns, and the arguments have been reiterated to show that a system under which the charities manage their own affairs has worked to the advantage of the public, while fostering the advancement of medical science. It was assumed that this independence was a corollary of the fact that the benefits bestowed by the voluntary hospital were gratuitous and that the medical staffs were unpaid. An alteration in professional opinion must be recorded here, as the Association recognises when admitting a dual interpretation of the voluntary principle. The purely charitable side, it is stated, should be continued, wherein the whole cost of the maintenance of free patients is met by the gratuitous contributions received by the hospital, on whose behalf the services of the visiting medical staffs are given gratuitously; but it is added that patients, other than free patients, may be received for treatment at voluntary hospitals and that for them payment should be accepted by the hospital either from the patients themselves or, on their behalf, from the authority or body referring them to the hospital, and that on account of their treatment suitable methods of remuneration of the visiting medical staff should be arranged. This is a succinct statement of what is now a widely held professional view, but in the consequent pecuniary arrangements there are factors to be considered which will render difficult that desirable "medical staffing in accordance with principles approved by the medical profession." This is the place where the claims of the voluntary and the municipal hospitals may be opposed in a manner calling for delicate adjustment.

POLIO-ENCEPHALITIS SO CALLED.

A FEATURE of the Registrar-General's return of infectious diseases for many weeks past has been a high proportion of cases of polio-encephalitis relative to the number of cases of poliomyelitis. Three weeks ago, and again this week, the number classified as polio-encephalitis was actually higher than the number under the heading of poliomyelitis. We think it is right that these figures should be submitted to some scrutiny. Apart from certain cases in which the bulb or pons is involved, true polio-encephalitis is unquestionably a very rare disease, even at times when the poliomyelitis infection is prevalent. WICKMAN, in the great Swedish epidemic of 1905, saw no instance of polio-encephalitis; KRAUSE, in the Westphalian epidemic of 1909, saw only one case; ZAPPERT, in a collection of 555 cases of poliomyelitis, found only five cases which he regarded as polio-

encephalitis; PEABODY and DRAPER, among their own 183 cases, did not find a single typical case of polio-encephalitis; and SÖRENSEN, among nearly 100 cases in Copenhagen, saw no case which he could confidently describe as polio-encephalitis. It has been common, however, in this country, following the lead given by STRÜMPELL in Germany in 1885, to ascribe a large proportion of cases of hemiplegia in infants to encephalitis resulting from infection by the virus of poliomyelitis. These are cases in which, after a short period of malaise and pyrexia, convulsions occur and are followed by hemiplegia. The illness, like poliomyelitis, usually affects children within the first three years of life, and it is apt to occur during or shortly after one of the acute specific fevers. It is to be assumed that most of the cases included as "polio-encephalitis" in the official returns are of this nature.

These cases of infantile cerebral palsy, as was pointed out long ago by G. F. STILL, show neither the seasonal incidence nor the epidemic occurrence which are features of acute anterior poliomyelitis. Whereas in a very large proportion of the cases of the latter disease in this country the onset occurs during the autumn months, infantile hemiplegia appears to come on with equal frequency at all times of the year. Many epidemics of poliomyelitis have now occurred in different parts of the world, but no special prevalence of infantile hemiplegia has been described in association with them. A significant fact to which attention was drawn by STILL, and which has recently been proved anew by FAIRBROTHER and HURST, is that, in the experimental production of acute anterior poliomyelitis in monkeys, the intracerebral inoculation of the virus does not result in spastic paralysis of the cerebral type, but in flaccid (i.e., spinal) paralysis of the lower limbs, with the lesions of acute anterior poliomyelitis in the spinal cord. It is evident, therefore, that even in conditions which would seem especially to favour the occurrence of a cerebral paralysis the virus of poliomyelitis maintains its affinity for the spinal cord and does not produce the spastic paralysis which is seen clinically in infantile hemiplegia. There seems thus to be no sufficient ground for regarding infantile hemiplegia, coming on in association with a febrile illness, as having any close kinship with the more common spinal infantile paralysis.

At the present time there is another group of cases which is likely to swell the number of those grouped under the heading "polio-encephalitis." These are cases of encephalitis occurring in association with one of the specific fevers, such as measles, or even without any such association. Such cases of acute disseminated encephalitis seem to have been much more common during the last two or three years than formerly. The pathological changes found in the brain in these cases differ in many important particulars from those produced by the virus of poliomyelitis, and it is therefore certain that these cases are distinct from polio-encephalitis. It will be apparent that all statistics relating to polio-encephalitis must for various reasons be fallacious, and that they are likely to remain so as long as we are devoid of any specific test for recognising infection by the poliomyelitis virus. Whether any useful purpose is served by having a separate group for "polio-encephalitis" in the official returns seems doubtful. It will also be apparent that the diagnosis of polio-encephalitis is one which should be made at all times with reserve, and which, as applied to disease of the cerebral hemispheres, is hardly plausible except at times when poliomyelitis is rife.

PSYCHIATRIC REFORM.

Dr. MAPOTHER'S impressions of psychiatry in America, which we published last week, are timely seeing that the Mental Treatment Bill has not yet passed through all its stages. They will shock those who think we have nothing to learn from other countries and who are satisfied that the eighteenth and early nineteenth century reforms, in which England took a large part, so settled the principles of treatment of the insane that for ever in this country its abuses and corruptions are removed. In America ample money has been available for the endowment of missionaries on mental hygiene, and the Commonwealth Fund has acted on the principle that private charity is best directed towards financing hopeful experiments, withdrawing its support when the experiments have proved so successful that the work ought to become a part of the national duty. On these terms a child-guidance clinic has recently been started in London, and the British psychiatrists appointed to it visited America to study American methods. The International Congress of Mental Hygiene to be held in Washington next month will take many of our own mental specialists across the Atlantic, and there is constant interchange of medical and lay psychological workers between the two countries for brief periods of training. The chief point that emerges from Dr. MAPOTHER'S survey is the remarkable freedom of American psychiatrists from legal interference. America has learnt to trust her experts in a way that England has not. She has also learnt to subsidise efforts to secure mental health, both from State funds and private munificence. The governor and legislature in most progressive American States are content to limit their province in the realm of mental disease to deciding how much money they can afford for new ventures. Procedure varies from State to State, but the permanent Commissioner, if a psychiatrist with institutional experience, may have powers far exceeding those of our own Board of Control and has direct access to the legislature without the intervention of any layman. In the criminal courts the psychiatrist is more widely consulted and his advice more closely followed than anything dreamt of in this country. Where the court differs from the psychiatrist, the result is almost invariably a more lenient sentence: this is an answer to those who fear that reference to a psychologist means "coddling the criminal." The commitment regulations vary with different States, and in Maryland a patient can be committed for permanent detention on the certificate of two medical practitioners without judicial intervention. The system works well; actions for illegal commitment are no commoner there than elsewhere and practically never successful.

Another direction in which advance has been made in America is in psychiatric education, both of the public and of the profession. In contrast to the scanty instruction of students which is still a reproach to medical education in this country, the American medical schools teach medical psychology and psychopathology in each of the four years of the course; the students examine mental and neurotic cases, and they learn the psychological aspect of the ordinary hospital case. America has often been accused of over-specialisation, but she is not unaware of her own risk, as is shown by the recent foundation of the Institute of Human Relations at Yale. Here the future doctor, lawyer, clergyman, and business man are to come together for a common grounding in

psycho-biology. Dr. MAPOTHER summarises the situation by saying that American psychiatry is characterised by the domination of the medical spirit and the instinct to look rather to the future than at the present. Nevertheless, there is room for doubt whether the methods adopted in the United States of America are necessarily of value here. The conditions vary so greatly; the attitude of the public is so different; and more than this, the available resources are unlike. Conditions exist in America that would not be tolerated here, even though the scientific work in certain directions is far in advance of ours. It would perhaps be unwise to think of any country as being pre-eminent in psychiatry. Dr. MAPOTHER himself is sceptical of the Mental Treatment Bill, and, as we have pointed out, certain of its tendencies appear to be unfortunate. Whether he is justified in speaking of England in this respect as a lawyer-ridden country and in extolling the States as being comparatively free from this alleged evil is a matter of opinion. Some of his illustrations of procedure strike us here as odd. The power to use a habeas corpus procedure, which resulted in a patient shooting the lawyer who was instrumental in gaining him freedom, is a case in point. Some have wondered whether as a matter of fact there is more liberty in America than in our own land. At any rate, judging from what we read, the English are naturally a more law-abiding people; this being so, our machinery for dealing with mental illness may rightly differ from that of America.

The real value of Dr. MAPOTHER'S survey, as it seems to us, lies in showing the many and various ways in which America has tackled the problem of mental infirmity. Research, after-care, the study of social and individual conditions, occupation therapy, these are carried to an extent hardly envisaged in this country. Nevertheless the public institutions are very large, often greatly overcrowded, although they have a relatively large and highly trained medical staff. Movement of patients is far more free than here; admissions and discharges are relatively much greater. But when all this has been granted there is somehow left in the mind the query, are the patients better off in America? Have they really a greater chance of recovery? Is their treatment by the State and by the staff of the hospitals more sympathetic than it is in this "lawyer-ridden" country of ours?

A PRESENTATION has been made to Dr. A. Brown Ritchie by members of his staff, on his retirement from the position of school medical officer under Manchester authority.

BRITISH EMPIRE CANCER CAMPAIGN.—At a recent meeting of the Grand Council of this Campaign the following grants were approved: £2500 to St. Bartholomew's Hospital for work including the continuance and development of investigations in the deep X ray treatment of cancer, and the further study of malignant growths by slow-motion photography; £950 to St. Mark's Hospital towards its cancer research work; and £200, making a total grant of £300, to the Yorkshire Council of the Campaign towards a special statistical inquiry into the incidence of cancer shown by post-mortem investigations at some of the principal Yorkshire, Scottish, and London hospitals. The Council also confirmed a grant of £3900 to the Middlesex Hospital towards its cancer research.

The Council decided to convene an informal meeting to review present activities, and consider what further lines of research might be inaugurated. It will take place shortly after the Midsummer recess.—The Council approved the publication of a popular book on cancer which has been drafted by the investigation committee. This book has been prepared so that it can be appreciated by the lay public.—It was reported that the British Dental Association had nominated Mr. C. H. Howkins to serve as its representative on the Grand Council, and that, Dr. Powell White having retired through illness, the Christie Hospital, Manchester, had nominated Prof. John Shaw Dunn to serve in his stead.

Annotations.

"Ne quid nimis."

ROBERT BRIDGES.

THE death on Monday last of Robert Bridges, physician and poet-laureate, at the age of 85, brought to an end an interesting career—especially interesting because the finest flower of his intellectual achievement did not blossom until his last year. An uninformed reading of his life would lead to the idea that he drifted from medicine because he was unfitted for its pursuit, and that when he discovered his métier as poet he was too aloof and too severely artistic to be the interpreter of ideals which would inspire a work-a-day world. Robert Bridges, as a matter of fact, was a successful physician before he allowed the influence of classical studies at Eton and Oxford, and the urge, gradually growing in intensity, of poetic production, to detach him from our ranks. And although much of his poetry was directed to an audience composed of the highly educated, and even of the severely cultivated, neither its melody nor its teaching asked for any extraordinary intellectual grasp from the reader. And the fervour and patriotism of his singing was slowly making appeal to an increasing number of readers when last year he published the lovely "Testament of Beauty," wherein deep religious feeling was blended with the humanism of medicine and a knowledge of its fundamentals. In Robert Bridges all medicine had a great colleague, and its followers may well regret that his long life is closed.

THE ASTHMATIC REACTION IN CHILDREN.

WORKING in the University Children's Clinic in Berlin, Dr. J. Tuscherer[1] has analysed the records and made clinical observations on 152 cases of asthma or allied disorders. The diagnosis in four instances proved to be wrong, while in 12 other patients the illness was so short as to make the diagnosis doubtful. Tuscherer prefers the term "asthmatic reaction" for the cases he describes, and he would include under this heading all examples of true asthma, bronchial asthma, and nervous asthma as occurring in adults, the bronchial asthma and asthmatic bronchitis of children, and the spasmodic bronchitis of infants. As regards the mechanism of the attacks he follows modern authorities in analysing this into its nervous and secretory components (spasm plus excess of mucus in the bronchi), but he does not agree that the underlying nervous predisposition to the disease is necessarily inborn. Nevertheless, analysis of the family histories of the patients in this series showed asthma in the father in 12, in the mother in 11, in the grandparents in 15, and in other relatives in 16; 17 of the asthmatic patients had a family history of nervous trouble. The age of onset of symptoms varied in the series, but Tuscherer shows that first attacks may date back to early life. Three of his patients undoubtedly began to show signs of the asthmatic reaction during the first four months, and he gives details of one of these cases admitted with a respiration-rate of 85 per minute and an acute spasmodic bronchitis, rapidly clearing, at the age of only nine weeks. Subsequent history showed that this early attack was the beginning of the asthmatic reaction in this child. The association of asthma in children with the "exudative diathesis" of Czerny is emphasised, and the relation of infantile eczema to asthma is also brought out in this series. The alternation of asthma and eczema in the same patient was well illustrated in some of the cases analysed. The influence of infectious fevers in bringing out a latent disposition to asthma was seen in many instances. In the whole series of 152 cases the first asthmatic symptoms followed whooping-

[1] Jahrb. f. Kinderh., 1930, cxxvii., 20.

cough in 22 patients, measles in 11, and pneumonia in 22. In connexion with the last-named there is, of course, the fallacy that so-called pneumonia may really have been the first attack of asthma. Nasal catarrh was present in 73 cases, enlarged tonsils in 29, a tendency to run a temperature without obvious cause in 27, and "chills" preceding the asthmatic attack in 31. Climatic influences were also considered, and in 29 patients it was thought that the asthma was influenced by the weather. Psychical shock appeared to be responsible for precipitating the asthmatic attack in one case. As regards pathogenesis, Tuscherer sums up in favour of an unstable respiratory centre where stimuli both from higher parts of the brain and from other parts of the body may precipitate an attack. Prognosis can be summarised by saying that of the 152 patients 35 had lost their asthma before puberty, and 39 became clear of attacks after puberty.

THE HOSPITAL PATIENT FROM HIS OWN POINT OF VIEW.

THE charge is often levelled against hospitals that the patient is regarded as merely a case, while his personality is largely, if not entirely, neglected. To a certain extent this is inevitable, and for the most part those admitted are so appreciative of the medical and nursing attention they receive that they do not greatly resent the lack of that personal interest which forms a large part of the private practitioner's business. They are also marvellously tolerant of long delays and complicated processes which are never explained to them. Nevertheless there has been a definite change of attitude since the hospital service has been extended to the middle classes. Dr. W. S. Goodale[1] who takes up the cudgels on behalf of the patient as an individual, urges the speeding-up and synchronising of such preliminaries as the admission history, the bath, the interview with the almoner, the students' and house officer's history and examination, and the delayed and all-too-brief and uncommunicative visit of the physician or surgeon. The patient's next trouble is his food. The "house diet," says Dr. Goodale, "unalterable as the laws of the Medes and Persians, and garnished with a prune, apparently is planned for its calories and vitamins but with little regard, if any, for individual taste, much less national appeal." Why should not attractive alternatives be offered? He next attacks hospital smells and sounds, and contrasts the filtered, washed and cooled air of the picture palace with the mixed odour of iodoform, carbolic, creosote, sweat, bad teeth, and boiling vegetables that the hospital patient sometimes has to breathe. He also urges daily visiting for all convalescent patients; since this is allowed in private wards it cannot be consideration for the patient's welfare that restricts visiting in the public ward to four or five hours a week. He criticises the inadequate supply of nurses, and remarks, "If there is one nurse allotted to 10 or 12 patients during the day-watch and one nurse to 18 or 20 during the night-watch, the observing patient is soon able to phrase a fairly good working definition of 'delayed service.' . . . . . Why not a patrol nurse whose sole duty is to visit all patients voluntarily and to inquire whether or not she can be of service?" The tediousness of convalescence can be greatly reduced by a good library service and an educational occupation system. His proposed social service involves several revolutionary suggestions. The remark "no inquiries about patients can be answered by telephone" is familiar enough in the telephone directory and is certainly necessary as long as one harassed porter has to attend two large switch-boards as well as perform the ordinary duties of a door-man. Dr. Goodale suggests that a special social service should deal with all contacts with the public, providing a medium through which relatives and friends can blow off steam, whether by way of anxious enquiry or complaint. This department would also take over some of the duties now undertaken by the almoner, would see to the notification of relatives when a patient is on the danger-list, and make sure that every patient on discharge had suitable clothing, hair-cut and shave, at least a shilling in money, a proper destination, and an escort. It would also see to the reception of mourners and undertakers if the patient died. The anxiety of relatives is often very seriously increased by their inability to get any interview with a doctor, and Dr. Goodale suggests that representatives of the house staff should be present in the lobby or a special room at certain fixed hours of the day, ready and willing to meet the relatives of their patients. We are hardly yet ready in this country for his final comparison of a hospital with a hotel, and his suggestion that hospital management has much to learn from successful inn-keeping. Hotel employees, he says, have been trained to assume the attitude that the guest is always right and hotel managers have accumulated fortunes by astutely commercialising the Biblical aphorism "A soft answer turneth away wrath." Hospital employees and managers have both these lessons to learn. They are seldom, he admits, positively cruel, but their ignorance of psychology and their lack of attention to the personal aspects of their patient result in a negative cruelty expressed by a lack of that inexhaustible supply of kindness, consideration, and forbearance that the sick guest needs so much more than the healthy.

Dr. A. T. Holbrook, in an article accompanying Dr. Goodale's, maintains that hospitals are used too much for cases which might be treated outside them if the general practitioner made more careful examinations and used comparatively simple laboratory equipment in his own surgery. He also blames the practitioner for the state of affairs of which he complains so bitterly—i.e., that he is becoming a mere directing-post to specialists. The general practitioner of the future, he says, must have two qualifications—competence and honesty. He must be able to recognise and willing to call in help for conditions that are beyond him, but he must also be prepared to do conscientious and scientific diagnostic work in a measure quite uncontemplated by his predecessors.

[1] Jour. Amer. Med. Assoc., March 29th, p. 905.

THE PATHOGENY OF ANGINA PECTORIS.

MANY hypotheses have been formulated to account for the pain of angina pectoris, but of them two only have received much support. The one attributes the condition to disease of the aorta, the other to coronary arterio-sclerosis. Neither is completely satisfying, for the accused organ has been found healthy at autopsy in unquestioned cases of angina, while gross lesions of the aorta or of the coronary arteries may be present in patients who have never experienced anginal pain. The absence of pain in patients with advanced coronary disease may possibly be accounted for by a hyposensitive nervous mechanism; but the occurrence of angina in the absence of any obvious anatomical lesion calls for further explanation. Probably it would be more correct to speak of angina, not as a disease, but as a syndrome which may be attributable to various causes which all act in a similar way—namely, by producing anoxæmia of the heart muscle. The whole subject is critically reviewed by Dr. Douglas Hubble elsewhere in our present issue. Diagnosis cannot be regarded as satisfactory until it is possible to say which cause of pain is operative in any particular case. Already one definite pathological entity has been separated off from the group of lesions which may produce cardiac pain. That condition is cardiac infarction following thrombosis or embolic occlusion of one of the larger branches of the coronary arteries. In addition to pain following the anginal distribution cardiac infarction is accompanied by dyspnœa,

vomiting, shock, and other symptoms, which together with the duration of the pain itself render its recognition possible during life. The diagnosis of coronary occlusion once infarction is complete presents but little difficulty, and the problem which now requires solution is how to differentiate the pain associated with the earlier phases of this process from that of ordinary angina. Dr. Hubble in his paper describes a case which has an interesting bearing on this problem. In his patient the actual occurrence of infarction was preceded during a period of several weeks by prodromal anginal attacks of increasing severity. Dr. Hubble emphasises the fact that, in these attacks, the pain, so far as its character and distribution was concerned, differed in no way from that of simple angina. The difference was that the attacks occurred quite apart from exertion or emotion and were not relieved by rest. They were often accompanied by dyspnœa. The pain in this case was temporarily relieved by nitrites, but returned as soon as the effect of the drug had worn off. Dr. Hubble suggests that the action of nitrites in relieving the pain of angina is due partly to a lowering of blood pressure and partly to a coronary dilatation which temporarily improve the collateral circulation; but, as he goes on to point out, a lowering of the general blood pressure may accelerate thrombosis. For this reason alone even during the prodromal phase, nitrites are contra-indicated in the treatment of coronary occlusion, and it is important that we should be able to differentiate between these forerunners of myocardial infarction and the ordinary attacks of simple angina.

MEDICAL ADVICE ON BIRTH CONTROL.

A COPY of certain correspondence which has taken place between the Society for the Provision of Birth Control Clinics and the General Medical Council has been sent to us, and although nothing will be served by publishing the whole correspondence, the question raised in it is an interesting one from the ethical side. At the beginning of March a letter was sent by the secretary of the Society to certain practitioners, asking if patients seeking advice on birth control questions could be referred to them; for the Society receives letters begging information from people not in touch with any of their clinics, and realises that answers can only be given adequately by a qualified medical practitioner. The invitation to coöperation was sent by one of its recipients to the General Medical Council, with the result that a communication was received by the Society from the Registrar enclosing the Warning Notice of the Council in regard to advertising and canvassing, and going on to say "if an allegation were received that this (notice) was being contravened together with adequate evidence the matter would receive very careful consideration." The Society has replied to the Council expressing a desire to keep the rules of the Council, but pointing out that the Warning Notice is not relevant, when the Council replied upholding the contrary view, and in so doing could justify its contention. Yet the matter is not quite so simple as either the secretary of the Society for the Provision of Birth Control Clinics on the one hand, or the Registrar of the General Medical Council on the other, appears to consider. From the point of view of the Council it must be pointed out that it is proposed through the instrumentality of the Society to send women to consult doctors other than their own—that is to say, that the practice of one doctor through the instrumentality of the Society may be extended at the expense of that of another doctor. But from the Society's aspect of the case, it may be pointed out that before the instrumentality of the Society is sought, the patient has, in most or all cases, already decided to obtain certain medical advice elsewhere than from her doctor—in other words, she is intending to exercise that free choice of doctor which is associated with all modern relations between the public and the medical profession. Advice on the subject from the medical aspect cannot be given by correspondence, while a patient might desire particular counsel from someone other than her own family practitioner. The Society should certainly point out to the medical practitioners who express themselves willing to help them the necessity, first, of keeping the patient's own doctor informed of the advice given, and, secondly, of impressing upon the patient the fact that this advice is being given in a special manner, and not in the routine of practice.

THE CURRICULUM IN RUSSIA.

ACCORDING to the *Moskauer Rundschau* of April 13th a Russian national conference was recently held, at which proposals for the reform of medical education were discussed. A plan for the reorganisation of medical schools, as proposed by the authorities, was considered and the conference suggested the lines on which the chief features of the plan should be embodied in practice. It is proposed to have three different kinds of medical faculty at the universities, instead of one uniform type as hitherto. The three types of faculty will be: (1) general medicine; (2) public health and preventive medicine; and (3) maternity and child welfare. The faculty of general medicine will include several subdivisions, such as general treatment, surgery and internal medicine, and will also have a maternity and child welfare branch. The public health faculty will provide courses of studies intended to produce experts in general sanitary science and its branches, such as epidemiologists, experts in the hygiene of housing, and specialists in industrial disease. The third type of faculty will educate specialists in maternity and child welfare, and in children's diseases. The length of a medical course in any one of the faculties will be three and a half to four years. Some of the medical students will be evening students, and at the largest medical schools complete evening medical faculties are to be opened. It is stated that this will enable the number of medical students to be increased to 11,000 even in the current year; there were 3300 last year. The conference recommended that the use of Latin medical terms, "handed down from the Middle Ages," is objectionable. Appropriate Russian words are to be substituted for Latin terms in the study of medicine, in all medical clinics and in prescriptions.

THE ANTI-INFECTIVE POWER OF CAROTENE.

Prof. Edward Mellanby and Mrs. May Mellanby have a flair for subjects in experimental dietetics which hold great possibility of benefiting the public health. Apart from their well-known work on rickets and on dental caries, Prof. Mellanby has recently concerned himself with the study of vitamin A as an anti-infective agent, and offers observations which may prove of much importance in preventive medicine. It has long been known that in rats whose diet is deficient in vitamin A the mucous membranes throughout the body become especially liable to septic infection. This is seen more particularly in the eye, the respiratory passages and adjoining glands, and the bladder, and in drawing attention to the phenomenon Prof. Mellanby has pointed out that the septic foci of inflammation which occur in the rat are also found in man.[1] Within the last two years the whole question of the relation of carotene to vitamin A has come once more under consideration, and there is now no conflict of opinion that purified carotene can act as an adequate source of vitamin A, although the nodal problem remains unsolved, whether carotene itself functions as vitamin A, or whether it contains an impurity which defies all ordinary means of separation. In their most recent contribution, Green and Mellanby[2] do not set themselves to attack this problem, but seek to ascertain whether, in vitamin A deficiency, carotene can supply

[1] Green, H. N., and Mellanby, E.: Brit. Med. Jour., 1928 ii., 691.
[2] Green, H. N., and Mellanby, E.: Brit. Jour. Exp. Path., 1930, xi., 81.

the anti-infective agency as well as classical, colourless vitamin A was found to supply it. To those who have worked with purified carotene its complete equivalence with colourless vitamin A from animal sources is already an accepted fact, but there are several other points in this paper which require notice. It is made clear, for instance, that carotene may be of value in any case where vitamin A therapy is desirable, for it lends itself to accurate dosage, and can be administered without the accompaniment of the various lipoid liver derivatives which usually form part of vitamin A concentrates of animal origin. Green and Mellanby have further made a significant observation on dosage. They find that while 0·005 mg. of carotene will promote growth resumption in the rat, a much larger dose—something like 0·02 mg.—is needed for complete protection of the animal from mucous membrane infections. It thus appears that the outward signs of vitamin A deficiency may be suppressed at a certain dosage, and the deficiency may be manifest solely by the liability of the mucous membrane to infection. This observation has an obvious and probably very important bearing on the relation of vitamin A deficiency to mucous tract infection in human beings. The nature of the disposition to infection which the deficiency causes is not further illuminated, but it is hoped that the experimental use of carotene may throw light on it.

Carotene, or related lipochrome pigments, is widely distributed in the world of living organisms,[3] but is derived in especially large quantity, as its name implies, from the carrot. If the animal experiments are found to apply to human beings they will go far to justify the enthusiasm which vegetarians often profess for these vegetables.

In the North, it may be noted, an old recipe for treating a sick horse is, "Give him a feed of carrots and leave the light on."

AN EXPERIMENT WITH BCG.

THE remote country district of Trysil in Norway has been chosen for an interesting mass experiment. Since August, 1927, it has been visited by five successive expeditions of doctors and medical students who, up to August, 1929, had carried out Pirquet tests in 2427 healthy persons, 1079 of whom were Pirquet-negative, and were inoculated with BCG tuberculosis vaccine once or oftener. In an account of this work by Dr. O. Scheel, Dr. R. Schultz-Haudt, and Dr. T. Skaar in *Norsk Magazin for Laegevidenskaben* for March, a résumé is given of their findings. The technique of the inoculations with BCG was not uniform; in 1927 and in August, 1928, it was injected into the subcutaneous tissues in doses of 0·05 or 0·025 mg. This technique rarely gave rise to abscesses. In November, 1928, the BCG was deposited in the deepest part of the cutis, the point of the needle passing from the subcutaneous tissues upwards to the deeper structures of the skin. The dose was 0·025 mg. and the incidence of abscesses was high (38 per cent.). In August, 1929, the dosage was reduced to 0·02 mg. and the vaccine was deposited just under, or in the deepest layers of, the cutis. Infiltration of the skin at the site of inoculation occurred sometimes directly or a few days after it, but more frequently from six weeks to three months after it. These infiltrations, up to the size of a pea, lasted for weeks and even months, but within a year they had either disappeared completely or had left a small scar or a bluish discoloration. They often ended in abscess formation, the pus being evacuated from one to three months after the inoculation. Spontaneous evacuation could be avoided by aspiration, repeated if necessary. The more superficial the level at which the BCG was deposited in the tissues, the greater was the proportion of the positive Pirquet reactions after the inoculation. Thus, when the BCG was administered by subcutaneous injection, the Pirquet test became positive only in 31 per cent., whereas it did so in 81 per cent. of the persons given the vaccine by cutaneous inoculation. The same was true of the two other sequels of the BCG inoculation—infiltration and abscess formation—which became more frequent as the level at which the vaccine was deposited approached the surface of the body. It is not yet clear whether these three sequels to BCG inoculation can be correlated with a comparatively high degree of immunity; the subsequent fate of the persons in Trysil given subcutaneous injections may throw light on this problem when compared with the fate of those given cutaneous injections of BCG. What is already of great practical interest is the tuberculosis morbidity in Trysil since this mass experiment was started. Between the beginning of the experiment and November, 1929, signs of tuberculosis appeared in 20 persons. In four of these cases there was a history of tuberculosis dating back some time—a history obtained in 254 cases. Among 923 persons who had not previously shown any sign of tuberculosis clinically, but who had been Pirquet-positive, there were 10 who developed signs of tuberculosis. Among 171 persons not inoculated, although they were Pirquet-negative when first examined, there were three who subsequently developed signs of tuberculosis. Among the 1094 who were not inoculated, who had previously shown no clinical sign of tuberculosis, and who had given either a positive or a negative Pirquet reaction, there were as many as 13, or 1·19 per cent., who subsequently developed signs of tuberculosis, whereas among the 1079 Pirquet-negative persons who were inoculated, there were only three, or 0·28 per cent., who subsequently developed signs of tuberculosis. In all these three cases the contact which had been the source of infection was discovered, and as in one of these cases the manifestation of tuberculosis (an outbreak of erythema nodosum) appeared only 30 days after the inoculation—i.e., too early for the inoculation to have taken effect—the number of cases in which the inoculation apparently failed to induce immunity to tuberculosis may be reduced from three to two, or from 0·28 to 0·18 per cent. Comparing the tuberculosis morbidity of 0·28 (or 0·18) per cent. among the inoculated Pirquet-negative persons with the tuberculosis morbidity of 1·19 per cent. among the controls who were not vaccinated, the authors of this report claim that they have already made out a very convincing case for BCG inoculation of Pirquet-negative persons at various ages; but they admit that their figures are still too small, and the observation period too short for a statistical analysis which will conform to all the conventional requirements of a study of this kind.

[3] See THE LANCET, 1929, ii., 392.

MOSQUITO PROOFING IN BARRACKS.

MOSQUITO proofing in barracks has done much to prevent malarial infection in the army in India for seven years; we learn from a recent paper by Dr. R. Reitler[1] that it is also being used in industrial buildings, for he safeguarded the workers at a power station of the Palestine Electric Corporation on the upper waters of the Jordan in this manner in 1927. He admits that the destruction of the larvæ is the most complete of antimalarial measures, but observes that the expense may be prohibitive, though to keep mosquitoes away from the men by screening may be practicable. In the case of the Jordan water nine months remained, as it happened, before the Jewish workers could be employed at the spot, so there was time to build satisfactory houses for them, the men building them being, meanwhile, protected with nets, constantly supervised. The 40 houses were cottages of cement-concrete, with overhanging roofs, the windows and ventilators were protected with wire gauze, and the entrances with double-doored porches.

[1] Arch. für Schiffs- und Tropen-Hygiene, vol. xxxiv., Part 4 (April, 1930), p. 198.

The houses proved inadequate in size or number, and the overflow workers were lodged in ordinary huts with well-supervised mosquito nets, thus providing a control for comparison with the special houses. A man went round daily to catch and destroy all mosquitoes, and found in the first seven months 12 in the houses, 1902 in the huts, 3017 in open clothes lockers; so the screening of the houses was effective. In 11 months 17 fresh infections occurred among 77 men in the huts (2·0 per month per cent.), but only 16 among 377 men in the houses (0·38 per month per cent.). Thus the benefit from careful proofing is evident. In one month the gauze of one house was damaged, and 100 mosquitoes were found in that house in one week, and a case of malarial fever developed there within three weeks. Dr. Reitler quotes with approval from J. B. Hanafin [2] that in the tropics mosquito proofing is as necessary to a house as is in the Arctic a source of heat. By itself, he says, proofing does nothing to reduce malaria in the area, unless as here the mosquitoes are captured and destroyed and the larvæ pursued in the usual ways.

THE BRITISH ASSOCIATION AT BRISTOL

THE ninety-ninth annual meeting of the British Association will be held at Bristol early in September next, under the presidency of Prof. F. O. Bower, F.R.S. The Association has met at Bristol on three previous occasions, the first in 1836 when Lord Northampton, its President, laid the first stone of the Clifton Suspension Bridge, and the Geological Section had first-rate opportunity for field survey in the cuttings then being made for the Great Western Railway. At the meeting in 1875 Sir John Hawkshaw presided, and 1898 was memorable for an address by Sir William Crookes on the future wheat supply. Since that date Bristol has become a University city and the Association will meet this time in some of the finest academic buildings in the world, thanks to the generosity of the Wills family and the designs of Sir George Oatley. The programme will open on the evening of Wednesday, Sept. 3rd, with the presidential address in the Colston Hall on Size and Form in Plants. Addresses by sectional presidents to be delivered during the ensuing week will include (Chemistry) Prof. G. T. Morgan, F.R.S., on a State Experiment in Chemical Research; (Anthropology) Dr. H. S. Harrison on Evolution in Material Culture; (Physiology), Prof. H. S. Raper F.R.S., on the Synthetic Activities of the Cell, and (Psychology), Prof. C. W. Valentine on the Foundation of Child Psychology. Many of the discussions will be of wider scope through the merging of two or more sections for the purpose. For instance the sections of botany and agriculture will discuss the Mineral Element in Plant Nutrition; the Sections of physiology and psychology will discuss In What Sense Can We Speak of Primary Colours? And the three sections of geology, geography, and anthropology will discuss the Relation between Past Pluvial and Glacial Periods. These discussions will afford the opportunity on which the Association is based for conference and coöperation between scientific workers and others interested in all departments of science. Evening discourses will be given on Sept. 5th by Prof. E. V. Appleton, F.R.S., on Wireless Echoes; and on Sept. 9th by Dr. R. E. Slade on the Nitrogen Industry and our Food-supply. Public lectures will be arranged in Bristol and the neighbouring towns. The acting general secretary of the Association for 1929–30 is Prof. F. J. M. Stratton, and the local honorary secretaries for the Bristol meeting are Dr. W. Ludford Freeman, Dr. Bertram H. Rogers, and Prof. A. M. Tyndall. Between now and the Bristol meeting a loan exhibition of antiquities from Southern Rhodesia will be on view in London at the Assyrian basement of the British Museum. These are the result of excavations undertaken for the Association by Miss G. Caton-Thompson at Zimbabwe and other Rhodesian sites last year. Admission will be free during the hours when the museum is open. Future arrangements include a centenary celebration in London in September of next year, and meetings at York in 1932 and Leicester in 1933.

[2] Jour. R.A.M.C., 1928, ii., 127.

CYANIDE POISONING IN HOTELS.

Dr. Huntington Williams [1] records a number of cases of acute non-fatal cyanide poisoning apparently due to consuming silver polish. In June, 1928, he says, about 30 persons became acutely ill after dinner at a hotel in Utica. No evidence of food deterioration could be discovered, but on examination the powder used for cleaning silverware was found to contain over 20 per cent. of sodium cyanide It was ascertained that similar cases had occurred at many hotels where this compound and others containing cyanide were used as a routine. Usually the utensils were dipped about once a week in a solution containing the poison, and the result was that ineffective rinsing might easily lead to poisoning of the next guest who used them. Oddly enough, none of the servants employed in cleaning silver seem to have developed symptoms. These were acute gastro-enteritis with vomiting, purging, and later, signs of shock. In one of the cases recorded, diarrhœa was so violent and persistent that finally the patient was passing watery mucus; in another, blood-stained stools were passed. The shock was so severe that in more than one case the illness was critical, with pallor, sweating, dyspnœa, and thready pulse; in several cases also there was albuminuria. The managers of the hotels usually received the explanation with gratitude, and stopped the use of the dangerous preparations. Certain hotels which had received complaints of food poisoning from their guests have been able to record the disappearance of such complaints since these polishes have been abandoned. Legislation to prevent this danger has been attempted in the State of New York, where the sanitary code has been amended to forbid the use of any cyanide preparation or other poison for cleaning nickel, copper, or silverware, or other articles used in the preparation of food. The Department of Health of Newark, New Jersey, has placed a similar ban on the use of poisonous compounds for cleaning silverware, and warnings have been given through the American medical press.

THE DECLINE IN VENEREAL DISEASE.

THE gradual but steady decline of syphilis in European countries since the late war must be attributed largely to the intensive Government campaigns against the disease. The legislative measures employed by various countries provide interesting contrasts.[2] In Germany every person infected with venereal disease must, by law, attend a doctor, and if necessary his attendance can be enforced until treatment is complete. Though marriage while in an infective state is not at present forbidden, the patient is legally responsible for informing his betrothed of his condition before the marriage takes place. The power to refuse medical care is suspended in the case of venereal disease, and the sale of unofficial remedies is forbidden. This legislation only came into force in February, 1927, but previous public health work had reduced the incidence of syphilis considerably; in 1919 the incidence of new infections was reported as 8·7 per 1000 inhabitants, and in 1927 this number had fallen to 5·8. In the United States of America notification of his disease by the patient is compulsory, but variably enforced in different States, so that statistics cannot be exact. The annual incidence of new cases is estimated at about 1·5 per 1000 inhabitants, while the number of cases treated, old and new together, is roughly 4·2 per 1000. Among the negro population the incidence is higher,

[1] Jour. Amer. Med. Assoc., March 1st, p. 627.
[2] Bull. de l'Office Internat. d'Hyg. Publique.

standing at 2·4 per 1000, while the percentage of positive Wassermann reactions stands at 20 to 24. A steady decrease in syphilis in the army coincides with an equally steady, unexplained, rise among marines. The death-rate from general paralysis has fallen, but whether this is due to more efficient early treatment, reduced incidence of syphilis, or the use of malario-therapy cannot yet be decided. Probably all three have played a part. In France the incidence of primary infections is said to have fallen from 21·1 per 1000 in 1917 to 2 per 1000 in 1928; stillbirths fell from 48·3 per 1000 births (of living and dead children) in 1916 to 37·6 per 1000 in 1928. The venereal service has been developed, and propaganda has been undertaken on a large scale. In Algiers an energetic attempt is being made to combat these diseases, but it is still too early to demonstrate marked results, though the number of skin lesions among the populace seems to be decreasing rapidly. In Great Britain the effects of propaganda are shown by an increasing tendency for patients to continue treatment until cure is complete. Seventy-seven laboratories in England and Wales undertake the performance of the Wassermann reaction. The incidence of new cases is now assessed at less than one-fifth of the average annual incidence between the years 1911 and 1918. Infant mortality from syphilis has fallen from 2·03 per 1000 births among children under one year in 1917, to 0·71 in 1928. In Egypt and Turkey anti-venereal campaigns are being undertaken, but here again it is too early to estimate their results. In Yugoslavia stringent legal measures are taken against persons who infect others with disease during the course of their own treatment.

TRANSMISSION OF THE VIRUS OF DENGUE.

THOUGH a number of different mosquitoes have been incriminated as possible dengue vectors, the only species accepted as the unquestionable carrier is *Aëdes ægypti* (*Stegomyia fasciata*). Certain observers have suggested the possibility that other species, including *A. albopictus* (*S. scutellaris*, Walker), may also transmit the disease, but the results obtained by Koizumi, Yamaguchi, and Tonomura when they investigated the rôle of this insect were inconclusive. It appears that in the Philippine Islands *albopictus* is widely distributed; the larvæ are often found in the same breeding places as *ægypti*, and the relative proportion of *albopictus* has been shown to increase in June and July at which time dengue fever was prevalent in Manila. Simmons, St. John, and Reynolds[1] report experiments with a strain of dengue fever maintained since December 1928, by passage through six different batches of *ægypti* and six human volunteers. The imagines of *albopictus* had emerged from larvæ collected about Manila. On July 16th, 1929, 100 female mosquitoes of this species were given an opportunity to feed on a volunteer patient who had developed typical symptoms of dengue fever 12 hours earlier. The successfully fed mosquitoes were kept for a minimum period of 13 days before tests were made to determine their ability to transmit dengue to man. Each volunteer was isolated in a screened cubicle in a screened ward. The supply of virus was obtained in the first instance by transference from one volunteer to another through selected *ægypti*. Finally one volunteer developed dengue from the bite of a single mosquito and upon his blood a group of 54 female *albopictus* were fed. After periods of 15 and 20 days respectively, small groups of this batch of mosquitoes were tested on two volunteers, both of whom developed dengue fever five to seven days later. In all, seven successful transmision experiments were carried out, indicating that *albopictus* is highly susceptible to infection with the dengue virus. From the evidence already collected regarding the widespread distribution of *albopictus* in the Far East, it is obvious that this mosquito must be considered as a serious factor in the dissemination of dengue fever.

Not only has it been found possible to pass the dengue virus from volunteer to volunteer with precision, but also to transfer the virus from infected to normal *ægypti* without passage through a vertebrate host.[2] This was done in an ingenious manner by filling a cell (an ordinary rectangular staining dish) with citrated human blood and macerated dengue-infected *ægypti* over which the fresh depilated skin of a guinea-pig had been stretched and clamped. The apparatus was kept at 37°C. and inserted into a cage containing normal laboratory bred insects. The mosquitoes were at once attracted to the skin and in a short time most of them became engorged with the blood mixture. Subsequently they produced typical dengue fever in two American volunteers after an incubation period of six days. This method of infecting mosquitoes in the laboratory promises to be of distinct value in the study of virus diseases transmitted by mosquitoes.

[1] Simmons, J. S., St. John, J. H., and Reynolds, F. H. K.: Philippine Jour. Sci., February, 1930, p. 215.

[2] Same authors: Ibid., March, 1930, p. 381.

THE CASSEL HOSPITAL.

THE current report of the Cassel Hospital for Functional Nervous Disorders at Penshurst deals with the patients who were under care in the calendar year 1928. Of 67 cases of anxiety state, 60 improved while in hospital, and 54 were known to be well and improved a year later. Of 25 cases of hysteria, 19 improved while in hospital, and 15 of them were known to be well and improved a year later. Two obsessional compulsive cases both obtained lasting benefit. The 16 psychoneurotic patients who did not improve or who relapsed within the year are reviewed in detail. Three who improved but relapsed were all people of poor morale, and their temporary improvement could only be attributed to their residence in a sheltered environment. None of the patients discharged during 1928 subsequently claimed to have been cured elsewhere. According to custom the group labelled "psychopathic personalities" was kept as small as possible; four out of the nine patients comprising it showed marked improvement, and the others suffered from alcoholic or drug addiction. Of the 17 patients with schizophrenic symptoms two recovered, and out of nine depressed psychotics two went out well, but one has since relapsed, and three of those who were discharged unimproved have since recovered. Two patients suffering from hypochondria were discharged unaltered. Full tables are given in the report, and the individual cases described will be of interest to all who have to deal with problems of this kind.

THE Rockefeller Foundation has made a grant of £2000 a year for two years towards the work of the National Institute of Industrial Psychology. The institute, it is stated, has already received £14,500 from the Foundation.

THE library of the Royal Society of Medicine is in future to remain open until 10 P.M. on Thursdays as well as on Tuesdays and Fridays. All Fellows not resident or practising within one mile of the Society's house may now have books sent to them from the library, carriage paid.

Sir Alfred Watson, the Government actuary, has issued a report on claims for benefit under the Insurance Acts received by a representative group of approved societies. It is shown that the proportion of men claiming sickness benefit rose from 14 per 100 in 1921 to 23 per 100 in 1927, corresponding increases being recorded among women. In the latter year 430 out of every 1000 women drew sickness or disablement benefit, or both. Sir Alfred believes that the conditions of 1927 have not subsequently been alleviated.

The Clinical Interpretation of Aids to Diagnosis.

A Series of Special Articles contributed by Invitation.

LXIX.

SIGNIFICANCE OF PROTOZOA, SPIROCHÆTES, AND HELMINTHS IN THE BLOOD.

PART II.*

Trypanosomes.

AFRICAN trypanosomiasis is the most typical tropical disease in so far that it can be acquired only in tropical Africa. The classical picture of the fully developed trypanosomiasis is seldom seen in European patients. The cardinal signs of trypanosome fever, its adenitis, the typical rash, and the nervous involvement may not all be evident at the same time, and yet the patient may be suffering from trypanosome infection. In the early stage of the infection the parasite circulates in the blood stream, but later it invades the central nervous system, penetrating the brain substance and invading the cerebro-spinal fluid. Even in heavy hæmic infections in man the trypanosomes are never so abundant in the blood stream as they are in artificially infected animals, such as the rat and the guinea-pig. Moreover, experience tends to show that the abundance of these parasites in the peripheral blood does not necessarily indicate that the disease is more severe or less easily curable than when they are scanty and extremely difficult to demonstrate. Two forms of human trypanosomes are recognised in Africa, an acute form due to *T. rhodesiense* and a more chronic and less virulent form due to *T. gambiense*. It is difficult, almost impossible, to differentiate these two diseases by the morphology of the circulating trypanosomes, and their identity can be determined only by sub-inoculation into susceptible laboratory animals. On the whole it may be said that in *rhodesiense* infections the trypanosomes are more abundant in the blood stream and that they tend to recur in showers, each corresponding to an increased pyrexia and an intensification of the objective symptoms of the disease. In the microscopical diagnosis of a suspected case prolonged and careful search of the blood is necessary. A wide field of the blood film must be examined; it is inadvisable to search with high powers of the microscope, for the trypanosomes can be readily picked up with the 1/6 in. lens and a wider field of blood thereby surveyed. The clinician cannot, however, rest assured with one negative blood examination for trypanosomes. I have had cases in which the organism has only been demonstrated after the twentieth consecutive test. As has already been stated, the parasite tends to appear in waves. The most likely period for successful search is when the patient exhibits by malaise, headache, splenomegaly, adenitis, or the characteristic rash, an exacerbation of symptoms. The recognition of one undoubted trypanosome in the blood film is an absolute assurance of a correct diagnosis. I have had two cases in Europeans, both terminating fatally, in whom only one trypanosome had been found in the blood stream during observations extending over one year, and in both there was a heavy infection of the brain and cerebro-spinal fluid with the organisms. In a wet blood examination auto-agglutination of the erythrocytes, which is frequently seen in trypanosomiasis, is very suggestive, though not necessarily pathognomonic. The employment of thick blood films is of doubtful advantage; centrifugalised citrated blood taken from a vein may be used. Puncture of the affected lymphatic glands and examination of the abstracted lymph for trypanosomes may give a greater chance of a positive diagnosis than blood examination. In cerebral trypanosomiasis the trypanosome may or may not be present in the cerebro-spinal fluid but the cell or globulin content is invariably increased so that, in the absence of any other positive evidence, this should be considered conclusive. Inoculation of 2 to 10 c.cm. of suspected blood into some susceptible laboratory animal may be tried, though with the non-virulent strains of *T. gambiense* even this may not be effective in proving the diagnosis.

There is another form of human trypanosomiasis, Chagas' disease of South America, caused by *Trypanosoma* (*Schizotrypanum*) *cruzi*. It is primarily a disease of the armadillo and occurs as an accidental infection mostly in children, in whom the parasites may be found sparingly in the blood.

Leishman-Donovan Bodies.

Kala-azar is a tropical fever, with splenomegaly, great emaciation, and enlargement of the liver which has to be differentiated from chronic malaria, with which it has many features in common. The Leishman-Donovan body, the specific parasite, cannot generally be demonstrated in blood films, so that other criteria, such as the associated fever, the splenomegaly, the characteristic leucopenia, and a positive serum-formalin reaction must be taken. The diagnosis is clinched by splenic or hepatic puncture and the demonstration of the parasite in films of pulp withdrawn from these organs. At the same time the abstraction of 2 c.cm. of blood from a vein into 1 c.cm. of sodium citrate solution in a sterile test-tube is recommended. The deposit at the bottom of the tube is inoculated into tubes of Novy, Nicolle, and MacNeal's medium and incubated in a cool incubator. By this means it is possible in a large percentage of cases to culture the organism from the blood. In some forms of kala-azar, notably in Madras and Assam, the parasite can be found in the blood in about 20 per cent. of cases examined, especially if thick blood films are used and when the blood is diluted in Locke's solution and subsequently centrifugalised. If all the available methods are employed, the diagnosis of kala-azar is rarely missed.

The Treponema of Relapsing Fever.

Relapsing fever is a widespread and almost cosmopolitan disease of very variable intensity. The most virulent is the "tick fever" of Central Africa. The *treponemata*, or spirochætes, are usually demonstrable in the blood in the febrile periods, often in great numbers, and they are easily detected in blood films stained by Leishman's stain. But there are mild cases in every epidemic in which the parasites are very scanty in the peripheral blood and then thick blood films have to be employed for their demonstration. For the proper appreciation of the diagnosis of relapsing fever it is necessary to remember that the parasites are completely absent from the peripheral blood during the apyrexial period and that in the febrile paroxysms, even when the patient is acutely ill with symptoms of the disease, the spirochætes become broken up and disappear 48 hours or so before the crisis. It may therefore be necessary to make a diagnosis of relapsing fever in the absence of a positive blood examination. In this disease there is a well-marked polymorphonuclear leucocytosis which persists during pyrexia, but disappears during apyrexia. A leucocytosis may therefore be of considerable assistance in suggesting the diagnosis.

Leptospira Icterohæmorrhagiæ.

The organism responsible for infective jaundice, or Weil's disease, the *Leptospira icterohæmorrhagiæ*, exists in the blood stream in the febrile period, and may be transmitted to guinea-pigs by intraperitoneal injection of whole blood. Indirect methods of diagnosis have to be used, since this organism can hardly ever be detected by ordinary blood film examination.

* Part I. appeared last week.

The Filaria.

It is generally assumed by those who have not practised in the tropics that *Filariasis* is merely of academic interest, but this is by no means true. The most important parasite is *Filaria bancrofti*, in which the adult worms inhabit the lymphatic channels, while the corresponding embryos, or *microfilariæ*, are found circulating in the blood stream. This filaria gives rise to a number of clinical manifestations, of which filarial adenitis, hydrocele, filarial lymphangitis, and elephantiasis are the chief expressions. The most ready method of making a diagnosis is by the discovery of the microfilariæ in the blood stream, and, as is well known, in the typical *F. bancrofti* infection, these minute nematodes appear in the peripheral blood only during the hours of night so that in a straightforward case of filariasis only night specimens of blood will be positive. It is necessary to take enough blood to render discovery of microfilariæ possible. Thick films only should be used. In the Pacific variety of *F. bancrofti* the embryos appear in the peripheral blood by day as well as by night, a circumstance which cannot as yet be satisfactorily explained. Many factors combine to render diagnosis of filariasis by blood examination extremely difficult. It has been found that the adult parasites can exist for several years in the body without the presence of microfilariæ in the blood stream and also that the more damage the adult worms produce in the tissues, the more difficult it is for the corresponding microfilariæ to enter the blood. So that we are presented with this curious anomaly—namely, that the more extensive the external signs of filariasis become, the less easy is it to make a positive diagnosis by blood examination. Under these circumstances other aids to diagnosis must be called into operation. *Filaria bancrofti* infection gives rise to a considerable degree of eosinophilia, usually ranging from 15–20 per cent.

In *Filaria loa* (*Loa loa*) infections, which prevail on the West Coast of Africa, a somewhat similar problem presents itself. The patient may suffer from manifestations of this infection and be conscious of harbouring filaria worms in his body for as long as six years without at the same time exhibiting the characteristic microfilariæ in the blood stream. These embryos appear in enormous numbers in the daytime only, in contra-distinction to the habits of *F. bancrofti*. *Loa loa* gives rise in the stages of invasion to a very high eosinophilia, possibly up to 60 per cent., and this eosinophilia may be an important diagnostic pointer when microfilariæ cannot be found.

Filaria perstans (*Acanthocheilonema perstans*) is another parasite prevalent in Central Africa. The patient may harbour several adult nematodes for years without the appearance of the characteristic unsheathed microfilariæ in the blood. This worm also produces a high degree of eosinophilia, which may constitute the only tangible evidence of the presence of the parasite in the body. The microfilaria perstans can be found in the blood both by day and by night, but it exists usually in small numbers, so that a considerable quantity of blood (20 c.mm. or more) has to be abstracted and searched.

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LONDON LOCK HOSPITAL.—At the annual meeting recently Lord Kinnaird stated that since the inquiry in 1928 every effort had been made to increase the efficiency of the hospital. The board of management has been enlarged to 18 members, one-third of whom, for the first time in the history of the institution, are women. Maternity work more than doubled during the year, and the nursing arrangements of the male hospital have been entirely remodelled. The hospital, which is heavily in debt, has to face the cost of removing the training home to the country.

Special Articles.

THE SURGICAL CLINICS OF HEIDELBERG AND FRANKFURT-ON-MAIN.

Notes on a Recent Visit by

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SURGEON TO THE LONDON HOSPITAL.

A VISIT to a foreign clinic is always of interest, for we may be brought into contact with standpoints quite different from our own, and with organisation, methods, and resources from which there is much to be learnt. At the present moment, when relations with Germany are again being resumed, a visit by a group of surgeons to the clinics at one of the oldest universities and at one of the most important business centres is a matter of general interest, and I venture to record our impressions in the hope that others may share our very happy experience.

The Pilgrim Surgeons are a small group who have made it a custom to travel together for a week in every year, to see the work of others, and most of all to see it together. We have visited France, Switzerland, and Holland, and this year left London on Feb. 28th to visit Germany for the first time since the war.

We selected Heidelberg and Frankfurt as being within easy reach and as possessing surgical clinics of renown. Arriving at Heidelberg on Saturday evening we spent Sunday in the enjoyment of its beautiful surroundings. This is essentially a university town situated on the swift stream of the Neckar and surrounded by the wooded hills of the Black Forest. In term time its streets are crowded by its 3000 students, but now it was vacation and there was not one to be seen, but instead there were crowds of children parading the streets in fancy dress, for we had arrived in the middle of the Carnival.

Heidelberg: Prof. Enderlen's Clinic.

Monday morning at 9 o'clock found us in Prof. Enderlen's Clinic. He had very kindly arranged a series of operations for us and on this morning they included a large goitre in a woman of 44, cases of gall-stones in two women of 22 and 31, a gastrectomy for an old perforated ulcer of the stomach in a man of 32, and a perineal excision of rectum in a diabetic man of 47.

Prof. Eugen Enderlen is 67 years old, but there was no sign of his age in his dexterous technique. Although he spent infinite trouble in securing perfect hæmostasis, he succeeded in completing this considerable list of operations in three and a half hours, with intervals in which he discussed with us special points in technique. As in all Continental clinics, he has behind him a perfect organisation which includes 10 highly skilled surgical assistants, some of them of professorial rank. At one time we counted in the theatre two sisters, three nurses, and 15 other assistants of various grades, including of course the theatre men, and indeed we were compelled to admiration for an organisation which could make use of so many individuals to one purpose.

On Tuesday morning he performed for our benefit a similar list of operations, cases of goitre, of gall-stones, and of carcinoma of the stomach, and a thoracoplasty for pulmonary tuberculosis. The operations were, moreover, preceded by a tour round the wards commencing at 8 o'clock, and were followed by a demonstration of many old cases of interest. The Professor was tireless, and we began indeed to wonder whether there had not been some mistake in the date of his birth certificate.

The Surgical Unit over which he presides contains 250 beds, including 35 private rooms where patients pay from 8*s*. 6*d*. to 13*s*. 6*d*. per day. It includes a large out-patient department, and in accordance with continental practice the whole is under the absolute control of the Professor, whose assistants carry out all the pathological investigations he requires, make all the X ray examinations, and carry out much other work which would in England be specialised. The system has undoubted advantages in organisation, but it gives little opportunity to the younger men, whose initiative is unlikely to survive 10 or 15 years in a subordinate position. The wards were plainly but efficiently furnished, and it was evident that the Professor and his staff were on the best of terms with their patients, but we were scarcely prepared for the scene which greeted us in the Children's Ward. The whole of the children were celebrating Carnival. They had all been provided with masks and tin trumpets and our appearance was the signal for a deafening outburst. One small group were doing the thing thoroughly and fixing up one of their number with the aid of yards of strapping on a gallows splint as a case of fracture of the femur.

Of technical details the one which impressed us most was the method almost universally adopted in the treatment of fractures by means of Kirschner's wire. Instead of a thick pin, fine steel wire 1·5 mm. thick is passed through the bone by means of a special form of drill. The wire is then stretched on a frame and to this frame any necessary extension may be applied. The advantage over the ordinary calliper and pins is that the hole of entry is so small that infection is almost impossible, whilst the method may be applied with facility to such small bones as the metacarpals and phalanges. The control thus obtained of the fragments is very remarkable and enables the most perfect apposition to be achieved and maintained.

In the evening the Professor and three of his Assistants joined us at dinner and we spent some delightful hours in discussing the many interests we had in common. One thing struck us very forcibly, the high position held by a Professor in the regard of the public. It is true that Prof. Enderlen's long service has rightly earned for him a great position in Heidelberg, but Germany pays a tribute to intellectual power which is sadly lacking in England. In what English hotel would the social standing of its visitors be advanced quite obviously by the fact that the Professor of Surgery had done them the honour of accepting an invitation to dinner? We have other things to learn from Germany besides technique.

Frankfurt: Prof. Schmieden's Clinic.

From Heidelberg we went on to Frankfurt, and Wednesday morning found us in Prof. Victor Schmieden's Clinic. He operated for us in the magnificent demonstration theatre capable of seating 200 students, and equipped with every appliance that could be desired. He had selected for us two cases, both of considerable interest. The first was one of pyonephrosis of an abnormal kidney situated in the floor of the pelvis. It was approached by a transverse incision above the pubes which divided both recti muscles, and having been fully demonstrated across the peritoneum, it was finally reached from behind the peritoneum of the right iliac fossa and removed. The operation was technically difficult from the great number of blood-vessels which supplied the kidney and which appeared to come from the iliac vessels of both sides, but it was finally completed in a most satisfactory manner. The second operation was for a double duodenal ulcer, and was of interest from the fact that the precise character of the two ulcers and the mobility of the duodenum were all demonstrated beforehand by the radiologist. In accordance with Continental custom, the duodenum was resected and a modification of Polya's operation carried out. It is interesting to notice the disfavour into which gastro-enterostomy has fallen all over the Continent, and one wonders whether the large incidence of jejunal ulcer which is said to have occurred may be due to some difference in race or in diet, for English statistics show an entirely different picture.

The operations were followed by a lecture by Prof. Hans Holfelder on deep X ray therapy. He expressed the opinion that wave-length was not of such importance as has been alleged, and considered that it should be possible to obtain with deep X rays all the results which can be obtained with radium. Of the latter, however, he had no experience, as there is little or no radium in Germany. He described two cases of carcinoma of the stomach which he considered had been cured by X rays and 12 cases of carcinoma of the œsophagus, four of which had remained well over a considerable period.

After the lecture we were entertained at lunch by Prof. Schmieden and met several members of his staff including Dr. Herbert Peiper, his first assistant, who has specialised in neurological surgery and carries out all the cerebral work in the clinic. We also met Dr. Joseph Wirth, medical superintendent of the hospital, who told us something of its organisation. It is a public hospital, with 2500 beds and is supported entirely by the State. Of these beds only 350 are allotted to the Academic Surgical Service over which Prof. Schmieden presides.

The afternoon was devoted to a visit to the X ray department under the control of Prof. Holfelder, reputed to be the finest in Germany. It is accommodated in a building especially erected for the purpose, and it was equipped in a manner which excited our envy and admiration. The room for deep X ray therapy, in which we were chiefly interested, was divided into two large apartments, each containing a battery of three "cannons" containing Coolidge tubes. The high tension current was supplied from a stabili-volt apparatus by Siemens-Reiniger-Veifa, working at a pressure of 300,000 volts. Each cannon was a lead tube some 6 feet long by 18 inches in diameter, with a wall an inch in thickness, but this enormous mass of lead was so beautifully balanced that it could be rotated by a touch into any position, whilst vertical adjustments were controlled by a small motor. It is impossible to describe the details of the apparatus, but it was so easy to manipulate that a nurse could adjust it single-handed, whilst by a most ingenious system of interlocking the screening and exposure were made practically fool-proof.

The diagnostic equipment, arranged on somewhat similar lines, was very complete and included a Titanos transformer by Koch and Sterzel, with an output of 100 milliamperes.

The Institute was fully equipped with ultra-violet and diathermy apparatus, but one of its most attractive features was a small lecture theatre surrounded by illuminated screens for the demonstration of films. The screens, which covered the greater part of two walls, were occupied by the current X rays of patients in the hospital and were demonstrated to us by Dr. Pansdorf, who is in charge of the diagnostic section. For absolute perfection of technique we have never seen anything to rival them, and as they covered almost every branch of radiography they were a striking tribute to the efficiency of the department.

On Thursday morning we again met in Prof. Schmieden's operating theatre where we saw two operations—an abdomino-perineal excision of the rectum for carcinoma in a woman of 25, and removal of the gall-bladder for gall-stones. The former was carried out on orthodox lines with a left inguinal colotomy and removal of the coccyx. Owing to the careful preliminary ligature of the mesenteric vessels there was remarkably little bleeding. In the gall-bladder case, access was obtained by an oblique incision in which the upper part of the right rectus was divided. In this case, as in all the other abdominal cases which we saw, we were very much struck by the facility with which the liver could be

brought down and access obtained to the bile-ducts. It would seem that mobility of the upper abdominal viscera and some degree of ptosis is a common feature of German anatomy.

The operations were followed by a demonstration by Prof. Holfelder of a number of cases treated by deep X ray therapy. Of a large number of cases shown to us the most interesting were the following:—

Carcinoma of thyroid, recurring after operation; treated six years ago.

Carcinoma of breast, amputated 14 years ago. Recurrence in spine treated nine years ago; in sternum, treated one year ago.

Carcinoma of breast, amputated seven years ago. Early recurrence in axillary and supraclavicular glands, treated at once; seven years ago.

Sarcoma of humerus, upper end, in baby of 4 months; treated four years ago. Series of X rays showing disappearance of the tumour and downward displacement of its site with growth of bone.

Lymphosarcoma of mediastinum, in boy of 18; treated four years ago.

Tumour of lung, probably a carcinoma; treated three years ago.

Pituitary tumours.—Two cases with severe visual symptoms; treated four and three years ago. Recovery of vision.

Hæmangioma of lip.—A huge tumour in a baby treated four years ago. Excellent result.

The cases were selected to show the late results of deep X ray therapy, and in none of them was there now any evidence of active disease. In cases of carcinoma of the tongue and of the uterus Prof. Holfelder claimed to have obtained results comparable with those of radium treatment, but he thought these cases too recent to be worth demonstrating. We were greatly impressed by the skill with which all the cases had been treated, by the magnificent apparatus, and superb organisation of the whole department, and by the thoroughly scientific manner in which the problems of deep X ray therapy are being attacked. We appreciated the very cautious optimism of Prof. Holfelder and his colleagues, who fully realise that they are engaged in pioneer work upon a very difficult and elusive problem

In the evening Prof. Schmieden invited us, together with the staff of his own department, to a glorious performance of *Lohengrin* in the famous State Opera House of Frankfurt, and afterwards entertained us all at supper at the Park Hotel. There was no one in the party who had not borne his share in the war, and as our first personal contact since the years of conflict we all felt it to be a very moving occasion. The atmosphere could not have been more cordial, and there was a very evident desire on both sides for the renewal of old friendships. Each of us felt that the very differences in our outlook, our methods and our opportunities, would make a partnership all the more valuable.

Conclusion.

We have come back with many happy recollections and with many new impressions. The old Germany which we remembered before the war, hide-bound in rigid discipline and aggressive militarism, seems to have disappeared, and in its place we found a liberated nation, imbued largely with our own ideals, but with an enterprise and a determination to succeed which somehow for the moment, but only, we believe, for the moment, we have lost. In spite of enormous difficulties Germany is rising again to take her place among the nations of the world, not as a menace, but as a hope, and her desire for our friendship is based not upon self-interest but upon a realisation of all that we hold in common.

CHARING CROSS HOSPITAL PATHOLOGICAL INSTITUTE.—At the annual meeting of the Governors Mr. George Verity stated that the Pathological Institute was "doing untold good" in examining patients who are not of necessity eligible for treatment in the hospital, but can be treated by their own medical attendants at home. The work will, however, be in jeopardy unless £1000 is quickly subscribed towards it.

RADIOLOGICAL SERVICES IN HOSPITALS.

A JOINT MEMORANDUM.

A MEMORANDUM on hospital policy regarding radiological services has been issued by the British Institute of Radiology, incorporated with the Rontgen Society, with the approval of the British Medical Association. Copies of the memorandum are being sent to all voluntary hospitals in Great Britain and Ireland, and to public health authorities now responsible for the transferred hospitals. Copies of the memorandum may be obtained from the Institute, 32, Welbeck-street, London, W.1. The text of the memorandum is as follows.

The Hospital Department.

A hospital receiving charitable contributions should not manage its radiological department so as to make a profit for the hospital by the exploitation of the professional services of the visiting radiologists.

The classification of patients shall be that of the British Medical Association's Hospital Policy, but for radiological services it is recognised that there will be exceptional patients for whom specially expensive examination and treatment is necessary, and for whom the income limits shall not be restrictive.

A hospital should require payment of fees from patients attending for radiological services except from those who are members of a contributory scheme which provides such services or from those who come within the category of "free patients." An agreed share of such fees, or an agreed honorarium, should be placed at the disposal of the medical staff.

A hospital may, on the advice of the visiting radiologist, arrange a schedule of modified charges for radiological services for patients within the scale of income limits, and based upon an average of one-half the fees commonly charged for similar private work in the district; but the schedule so arranged should not be published or exhibited publicly.

Its Relation to Outside Practitioners.

A hospital situated in a district where there are qualified medical practitioners carrying on in private the practice of radiology should not provide radiological services for any patient able to pay private fees for such services.

A hospital in a district where there is no other radiologist than the radiologist to the hospital may allow this officer to receive directly from private practitioners private patients who shall pay fees not less than those charged in private for similar cases in similar districts, and the radiologist should receive not less than two-thirds of the fees so paid.

Radiological services for statutory authorities —e.g., Ministry of Health, National Health Insurance, municipal bodies, &c.—should ordinarily be arranged to be supplied in private by private practitioners. Where such arrangements must be made with a hospital the fees payable for the services shall be made upon a scale made upon the advice of the visiting radiologist.

Admittance of Patients.

The normal approach to the radiologist is through the medical officers of other departments of the hospital, but in exceptional circumstances cases may be referred direct to the radiologist by private practitioners.

The hospital almoner or other proper officer should certify the suitability of patients for admission, and should assess and collect all payments from patients, but the right should be reserved to the visiting radiologist to receive direct the fees for medical services to private patients.

Fees for services to patients in pay beds should be paid to the visiting radiologist in each individual case, according to the service rendered, less an agreed proportion to the hospital to meet costs.

Remuneration of the Visiting Radiologist.

The minimum fee per visit of a consultant called in to a patient in a transferred hospital should be two guineas, with mileage in addition where necessary, and the minimum fee for each operation performed in such circumstances should be five guineas, the fee for a major operation being not less than ten guineas.

Where the remuneration of a consultant for regular periodic visits to a transferred hospital is on a salary basis, the amount of that salary should be a matter of arrangement between representatives of the local medical profession and the appointing authority, but regard should be had to the minimum fees laid down in the foregoing paragraph and/or to the basis of £2 12*s.* 6*d.* for consultant sessions of not more than two hours, with an allowance for mileage where necessary.

It is further agreed that case sheets and records of patients treated in hospitals including X ray films and prints should remain in the custody of the hospital; they must be regarded as confidential documents, and access to them allowed solely to the members of the visiting staff of the hospital.

The Services.

ROYAL NAVAL MEDICAL SERVICE.

Surg. Lt. F. B. Quinn to be Surg. Lt.-Comdr.

ROYAL NAVAL VOLUNTEER RESERVE.

Surg. Sub.-Lt. D. R. Goodfellow to be Surg. Lt.

ROYAL ARMY MEDICAL CORPS.

Maj.-Gen. R. S. Hannay, late R.A.M.C., retires on retd. pay.

Col. H. C. R. Hime, late R.A.M.C., to be Maj.-Gen., vice Maj.-Gen. R. S. Hannay.

Col. C. R. Evans, late R.A.M.C., having attained the age for compulsory retirement, is placed on retd. pay.

The undermentioned Lt.-Cols., from R.A.M.C., to be Cols.: C. D. Myles, vice Col. C. R. Evans, and H. R. Bateman, vice Col. H. C. R. Hime.

Temp. Lt.-Cols. to be Lt.-Cols.: Maj. J. S. Dunne, vice Lt.-Col C. D. Myles, and Maj. and Bt. Lt.-Col. C. M. Drew, vice Lt.-Col. H. R. Bateman.

Majs. to be temp. Lt.-Cols.: Bt. Lt.-Col. F. A. McCammon and A. Dawson.

Lt. (on prob.) N. H. Lindsay from the secd. list is restd. to the estabt.

ARMY DENTAL CORPS.

Maj. D. Blair to be Lt.-Col.

INDIAN MEDICAL SERVICE.

Capt. E. T. N. Taylor to be Maj.

Lt. M. G. Kelley to be Capt. (prov.).

The undermentioned officers retire: Col. W. D. A. Keys, Lt.-Col. H. H. Broome, Lt.-Col. W. C. Ross (on account of ill-health), and Maj. E. Calvert.

HARROW HOSPITAL.—The annual report, which contains a foreword by Lord Moynihan, shows that last year's record of patient-days (12,873) is an increase of 10 per cent. By direct payment and through their contributory associations the patients provided £2399, which represents fully one-half of the cost of maintaining the hospital for the year. The district nurses and health visitors of the Harrow District Nursing Fund paid over 12,000 visits to 402 new cases. The cost averaged 1*s.* 4*d.* per visit.

A RAT-RIDDEN HOSPITAL.—Dr. O. F. McCarthy, medical superintendent of Cork Mental Hospital, reports that the institution is infested by "thousands of rats." The hospital's rat-catcher formerly accounted for 1200 a year, but poison has failed, and floor boards often have to be taken up to remove the dead rats. One of the patients is stated to be suffering from rat-bite fever, having been bitten by a rat which she caught in her hand. A professional rat-catcher is to be engaged.

Public Health Services.

SCHEMES FOR THE PREVENTION AND TREATMENT OF TUBERCULOSIS.

BY C. O. S. BLYTH BROOKE, M.R.C.S. ENG., D.P.H.,
TUBERCULOSIS OFFICER, STOKE-ON-TRENT.

AT a time when local government is in a state of reorganisation, it is opportune to consider the working of the schemes for preventing and treating tuberculosis. These vary much in efficiency, although all of them have evolved along the lines originally suggested by Sir Robert Philip. National expenditure on tuberculosis is colossal, and there is a loss to industry through ill-health of many millions of working days, as well as a continued, though somewhat decreasing, actual loss of life. Yet the true nature of the disease has been definitely known for nearly fifty years, and its manner of spread by infection is being daily demonstrated. The only sure road leading to reduction in incidence is to reduce the chance at any age of encountering massive infection. Experience at village settlements shows that the incidence of the disease can be reduced to a vanishing point; at Papworth and Preston Hall no single case of tuberculosis has occurred among the non-tuberculous population. It is well known, too, that a large number of cases of tuberculosis can, if not cured, be brought to a state of moderate working capacity by means of adequate treatment and after-care. Our present schemes fail because they omit to provide some necessary link in the chain; most frequently missing is the adequate supervision of those chronic cases which are responsible for the widespread dissemination of tubercle bacilli.

The essential aspects of prevention are the provision of a pure milk-supply and the isolation of every open case of tuberculosis, understanding by isolation the provision of accommodation under more or less ideal hygienic conditions. When the reorganised departments have become stabilised, many of the present extravagant schemes ought to be overhauled and in many cases set upon a firmer basis. In other cases where more money should be spent, it would soon reduce the incidence and mortality of tuberculosis to such an extent as to result in an actual saving.

The Dispensary.

The dispensary, which is bound to remain the centre of any scheme should be adequately staffed with clerical assistance in order that proper records may be kept, without too much time being spent by medical officers on details of administration. The chief tuberculosis officer must have wide clinical knowledge, with opportunities of doing general medicine. If it is inadvisable for him to engage in general practice, he should have charge of medical beds in some hospital and be allowed to engage in consulting practice; for the taking over of the poor-law hospitals should make this easy. Further, if he is to be a useful consultant in cases of tuberculosis, he must keep in touch with its treatment by having charge of sanatorium beds.

The dispensary must not be allowed to confine itself to pure routine work. It must remain a centre for consultation in doubtful cases, and a place where known patients can be seen by an expert when any radical change in treatment may be advisable; occasionally, too, it may be used for carrying out certain lines of treatment such as pneumothorax refills, &c. Frequent attendance at the dispensary is to be strongly discouraged, except where it is needed—on non-medical grounds—for after-care of patients. No one can examine many chests carefully at one sitting, and a rough examination engenders careless clinical work at other times. To do no more

than weigh a patient and say "good morning," although occasionally permissible, will lower the prestige of the clinic in his eyes, and make him ask why he should spend time and perhaps money on an attendance. The "good attender" is often the unfortunate chronic bronchitic who has once had and therefore always retains the label of "T.B." He is probably unfit for work or unable to obtain it, and he does not fear tuberculosis very much because he has found himself little the worse since the diagnosis was made; so he enjoys a morning at the dispensary. The real case is reluctant to come. For social reasons he does not wish to be seen attending often, and if he is lucky enough to have work does not want to risk losing it; also he very sensibly tries to forget about his complaint.

Among the many attenders of the first class, the second may even get almost forgotten. It is the large clinics of this kind that have become the laughing-stock of the medical profession, and have lost for the tuberculosis officer the respect and needful coöperation of the general practitioner. Careful visitation by nurses and common sense can best regulate this difficult situation.

If it is desired that the dispensary shall also be the centre for after-care for the provision of extra nourishment, and the like, then this work should be carried on separately. The clinician should not be cumbered with such routine work, and it may usually with advantage be delegated to an assistant medical officer—engaged mostly in other work, but anxious to obtain experience in tuberculosis—or to the junior medical officer of a sanatorium who wants to see another side to the life of a consumptive.

Contacts.

The value of the centre for the examination and supervision of contacts is much debated, and probably depends in each case on the possibility of doing anything if tubercle is discovered. In an efficient scheme, fully realised, such supervision is of great value if reasonably conducted. Children, in whom definite diagnosis is almost impossible, should attend only if they are unwell or not gaining weight, when they may be referred to the preventorium. To examine hordes of child contacts is waste of valuable time if it is done thoroughly, and is useless if done carelessly. In the adolescent group as many contacts as possible should be examined, and visited regularly by the nursing staff. Certainly they should be examined carefully if symptoms begin. But it is waste of time unduly to press men and women to attend, if they are not really willing and feel quite well. They will not believe that they have tuberculosis even if told so. If it is possible to improve home conditions, I think it is of great value to seek sources of infection among the older generation, some of whom may have chronic disease without knowing it. But where no practical good can come from the discovery of a case, it is not worth while to seek one, whose discovery may do no more than cause distress to relatives. When it is seen that nothing further is done, the prestige of the department is lowered. I am doubtful of the value of health lectures to such cases by nurses or doctors.

If people are to be encouraged to accept early treatment and carry out the instructions given, there must be no contravention of the spirit of the regulations about the secrecy of notification. The need for tact in this matter must ever be impressed on all members of the staff, for its failure hinders a lot of patients, I believe, from seeking earlier advice.

The Practitioner's Recommendations.

Much routine work could be avoided by usually accepting the recommendations of the general practitioner without further investigation. This would help to interest the private doctor in a complaint which has largely been taken out of his hands, and would raise his standing in the eyes of his patients. The services of the tuberculosis officer would, of course, be available whenever desired, and the right to examine any case before admission to an institution would be maintained by the medical staff in order to prevent abuse of the sanatorium as a dumping ground for undesirable patients. But as a rule, where a respected practitioner definitely recommends a certain line of treatment, it is advisable to follow it in the first place, and alter it only later if necessary.

Institutional Treatment.

Adequate institutional treatment must be available if the work of the dispensary is to be of value. It is of little use to diagnose an early case and have to wait until it is an advanced one before beginning treatment.

In the first place, beds will be needed for cases of so-called surgical tuberculosis, both for adults and children. Probably they are best placed in a special orthopædic hospital, and they require little further comment. But for cases of pulmonary tuberculosis, several classes of institutions are undoubtedly needed. First, beds are required for so-called observation cases in order to establish a definite diagnosis. Much time should not be spent here: the patient himself often demands an early diagnosis, and sometimes may be prepared to give up only a short time unless he is convinced that he really has tuberculosis. Personally I think it much better that these beds should be provided at a local voluntary hospital. It is usually found that a diagnosis is sooner reached in such places, and no stigma attaches to the patient. Such arrangements tend to foster coöperation between the local and the hospital authorities.

Routine sanatorium treatment should be available for definite cases, whether sputum-positive or not, and also for doubtful cases in which pulmonary tuberculosis is the likely diagnosis, but in which cure may prevent a positive decision. The institution need not be run expensively; good food, open country, and graduated exercise are the essentials. Notification should not be required before admission to such a preventorium, for patients must not be deterred by fear of a stigma; moreover, every "open" case should be rigidly excluded, so that there may be no danger of contracting the disease if the provisional diagnosis is wrong. Such an institution would demand very little medical supervision, and prolonged treatment would seldom be needed.

For the next category of patient a hospital-sanatorium is essential. It must deal with cases in which treatment is likely to be of permanent benefit and it ought to have adequate medical and nursing staffs, and facilities for all forms of treatment. Combined surgical and pulmonary cases would be admitted here unless the prognosis were hopeless, and beds would also be available for surgical emergencies and other conditions complicating tubercle. This is necessary because at the hospital-sanatorium cases will receive more individual attention from the anæsthetist, surgeon, and nurses than they would usually get in the ordinary surgical wards of a hospital. It is important, further—and this is often omitted from tuberculosis schemes—to provide accommodation for the tuberculous woman who is about to be confined, and for her treatment during pregnancy. We know that after the birth of a child many go downhill rapidly, and if this is to be avoided they must have special care before and during labour. This is desirable, also, for the sake of the child, since only in an institution are precautions against infecting the baby likely to be sufficiently impressed on the mother. An antenatal and maternity ward would, therefore, form a part of the institution we are considering. It is occasionally desired to assess accurately the working capacity of the more chronic case, and this could rapidly be done in the hospital-sanatorium. This must necessarily be expensive, but not many cases under this heading will have to be dealt with unless a big area is drained.

Hospital accommodation for advanced cases should not be on too large a scale, or the hospital will certainly get a very bad name. Such accommodation may well be provided in several quite small institutions, which

must be near to the patients' homes in order to facilitate visiting; one at least of these is probably best attached to the former poor-law hospital. Adequate nursing facilities are, of course, necessary for such places, but the medical staff need only be small.

A further class of patient, and one that forms the great bulk of those provided for at the present time, lies between the two last considered. They are the chronic and fairly advanced cases, a large proportion of whom have positive sputums, and those who have undergone the treatment prescribed but are not well enough to return to unsatisfactory conditions of life. A modified convalescent home will accommodate the many chronic cases which every now and then need a little stimulus to continued existence—a principle recognised by the British Legion in their Douglas Home at Bournemouth, which has proved of great value to ex-Service men—and it will also take those who are not bad enough to go to the institution for advanced cases, though little good can be done for them, and those who have undergone treatment in the sanatorium, but are not yet fit for final discharge. Such a home need not be expensive, and could be run on very much the same lines as the preventorium. Graduated work would be provided for the earlier cases, and the more advanced could be allowed to potter about. Again, little medical supervision would be required, although in selected cases certain forms of treatment could be carried out or continued. The provision of such homes would greatly facilitate the removal of infectious cases from overcrowded surroundings where the patients are unwilling to submit to the discipline of a sanatorium, or to enter a home for the dying.

Children.

In outlining these types of institutions I have confined myself to the adult. The accommodation necessary for children is on similar lines, but may be reduced to (1) a hospital for the treatment of active and advanced cases, and (2) a preventorium for the convalescence of early and doubtful cases, as well as occasionally for contacts living in an infected household where the source of infection cannot be removed. However sceptical one may be of the value of the children's preventorium in the tuberculosis scheme, it undeniably plays a great part in the care of delicate children, whatever the cause of their debility.

After-care.

The whole scheme breaks down if proper after-care cannot be provided. Adequate food and clothing are, of course, essential, and these should now be readily obtainable in all cases through the newly constituted public assistance committees. In every case an endeavour must be made to obtain better environment, and when dealing with "open" cases this is necessary for the community as well as for the patient and his family. This can only be done by close coöperation with the housing authorities, and by the provision of hostels or colonies for the unmarried of both sexes. Any fear of the local authorities that it may be dangerous to set up such colonies should surely be allayed by reference to experience at Papworth. Further, if the patient is to maintain his general health (which is very important for all tuberculous cases), and is not to spend his time in overcrowded private rooms, cinemas, and public houses, an occupation suitable to his physical condition must be provided. This can usually be done only by subsidising some suitable industry; that it need involve no heavy financial loss is proved again by Papworth, as well as places like Leeds and Hull, where such industries are in operation.

Only, I believe, by consideration of all the points enumerated can a really adequate and economical scheme be carried through. If any part fails, the whole will fail in efficacy.

The expense of this ideal scheme would not be prohibitive if the area for which it is operative were large enough. But in many more places it would be found necessary for local authorities, if not to unite in joint committees, to contribute towards the cost of institutions which would provide for patients from several areas, as well as towards the salary of medical officers who might be part-time officers of another authority. The chief tuberculosis physician can well give his services for a population and an area much greater than those of most of the responsible councils.

If Sir Robert Philip's prophecy, made to the British Medical Association in 1928, that tuberculosis as a national problem would be completely solved in 50 years is to be fulfilled, improvement in our present work must soon take place. The objection that we are doing more for the tuberculous subject than for the healthy man must not make us wait until the housing and unemployment problems are solved before proceeding further. Only by helping fully the stricken in this generation can we hope to save the next generation; and we have been taught that our mission is to the sick rather than to them that are whole. The problem is similar to that which is dealt with by the Prisoners' Aid Societies; for the sake of the community as a whole, as well as for the sake of individuals, most of us believe that a full helping hand should be given to the ex-prisoner, even if it be occasionally or often abused. So should it be for the consumptive.

REPORTS OF MEDICAL OFFICERS OF HEALTH.

Borough of Macclesfield.

THE first report on the year 1929 to reach us is that for the borough of Macclesfield, prepared by Dr. Margaret Dillon-Leetch, medical superintendent of the isolation hospitals and school medical officer, who was appointed temporary medical officer of health after the death of Dr. J. Hedley Marsh in June.

The estimated population of the borough in 1929 was 34,000; birth-rate, 13·9. Death-rates per 1000 of the population: all causes, 15·9 (standardised, 14·6); tuberculosis, 0·65; cancer, 1·53; respiratory diseases with influenza, 4·2; heart disease, 2·2. Death-rates per 1000 live births: neonatal, 30; infant, 78; young child (1–5 years), 42; maternal from childbirth, 8·4. The registered stillbirths numbered 31, equivalent to 6·5 per cent. of the live births. These figures may be compared with the provisional rates for the 157 smaller towns given by the Registrar-General: births, 16·0; deaths, 12·3, and infant mortality 69 (see THE LANCET, Jan. 25th, p. 195); and with the provisional rates for England and Wales: tuberculosis, 0·96; cancer, 1·43; and maternal mortality from childbirth, 4·33 (see THE LANCET, March 29th, p. 700). Dr. Dillon-Leetch points out, as did the Registrar-General in giving his provisional figures, the adverse effect on the statistics of the epidemic of influenza and the very severe weather experienced during the first quarter of the year. Thus in Macclesfield out of a total of 542 deaths, 253 occurred during the first quarter, February claiming 134 and March 119; whilst influenza and respiratory diseases accounted for 92 more deaths than in the previous year. The four deaths which made up the maternal rate of 8·4 were all due to "other accidents and diseases of pregnancy and parturition"; but Dr. Dillon-Leetch points out that one of the two cases of puerperal fever notified developed pneumonia, was admitted to the General Infirmary, and died.

The Public Health Society reports in appreciative terms on the good work done by the day nursery for children under five years, the attendances for which numbered 5847 for the whole day and 834 for the half day; 83 mothers received domiciliary prenatal advice, and the total births numbered 473. The two centres give systematic instruction in housewifery to mothers, and receive much assistance from voluntary helpers. The local authority does not employ or subsidise any of the nine midwives practising in the area. The guardians' hospital has been fitted with a maternity ward, and a scale of fees

arranged for private patients, and the maternity and child welfare committee assist in defraying the cost of the confinement of poor mothers in this ward. Out of 24 samples of milk examined biologically, one, produced in the rural area outside the borough, was found to contain tubercle bacilli, and the veterinary examination of the dairy herd was being carried out at the end of the year. In addition three milch cows were reported under the Tuberculosis Order, two being found post mortem slightly affected, and the other in a fairly advanced stage of the disease. Five prosecutions were undertaken for added water in milk; two were successful but three, where the percentage of added water was given as 9·4, 5·6, and 5·8 respectively, were dismissed on payment of costs. In the case of two of the monthly examinations of the water-supply the public analyst reported that in his opinion chlorination had not been carried sufficiently far.

The closets have nearly all been converted to the water-carriage system, the accommodation being, at present: clean water-closets 8474, waste water-closets 264, pail-closets 19, and privies 94. Town-planning work has been taken over by the East Cheshire Town Planning Committee. The new houses erected numbered 129, 108 of which were State-aided, 74 being municipal. There are 17 slaughter-houses in constant use, ten being registered and seven licensed; and the Health Committee rejected an application for the erection of a new one.

INFECTIOUS DISEASE IN ENGLAND AND WALES DURING THE WEEK ENDED APRIL 12TH, 1930.

Notifications.—The following cases of infectious disease were notified during the week:—Small-pox 423 (last week 457); scarlet fever, 2226; diphtheria, 1432; enteric fever, 85; pneumonia, 1296; puerperal fever, 68; puerperal pyrexia, 107; cerebro-spinal fever, 15; acute poliomyelitis, 2; acute polio-encephalitis, 3; enteric fever, 13; typhus fever, 1; dysentery, 5; ophthalmia neonatorum, 123. No case of cholera or plague was notified during the week.

The case of typhus was the second within a fortnight to be notified in the metropolitan borough of Shoreditch, but on inquiry at the Western Fever Hospital—to which, as we reported last week, the mother and daughter were admitted for observation—we learn that their infection proves to be glandular fever (infectious mononucleosis). A niece of the elder patient is in St. Bartholomew's Hospital suffering from the same condition.

The number of cases in the infectious hospitals of the Metropolitan Asylums Board on April 15th–16th was as follows: Small-pox, 560 under treatment, 31 under observation (last week 682 and 23 respectively), scarlet fever, 2105; diphtheria, 2785; enteric fever, 27; measles, 1067; whooping-cough, 65; puerperal fever, 29 (plus 17 babies); encephalitis lethargica, 120; poliomyelitis, 2; "other diseases," 25. At St. Margaret's Hospital there were 17 babies (plus 8 mothers) with ophthalmia neonatorum.

Deaths.—In the aggregate of great towns, including London, there were 2 deaths from small-pox, 4 (1) from enteric fever, 122 (63) from measles, 10 (5) from scarlet fever, 42 (4) from whooping-cough, 43 (8) from diphtheria, 44 (11) from diarrhœa and enteritis under two years, and 60 (9) from influenza. The figures in parentheses are those for London itself.

The deaths provisionally classified to small-pox were assigned to Camberwell (Met. Boro.) and Leeds. The deaths from enteric fever outside London were reported from West Ham, Plymouth, and Leicester. Fatal cases of measles were widely distributed with larger numbers at Salford, 11; and Manchester, 6. (Glasgow reported 10.) Whooping-cough claimed 5 victims each at Birmingham, Liverpool, and Manchester. Diarrhœa accounted for 6 deaths at Liverpool, 4 at Birmingham. No more than 3 deaths were attributed to influenza in any large town.

The number of stillbirths notified during the week was 301 (corresponding to a rate of 41 per 1000 births), including 70 in London.

FATAL CASES OF SMALL-POX.

The fatal case of small-pox reported in last week's return from the metropolitan borough of Stepney was that of a woman of 66, the widow of a dock labourer, who had been for many years an inmate of the South Grove Institution. The disease began on March 22nd; the rash appeared on the 25th, when she was removed to the Joyce Green Hospital, where she died on April 2nd. We learn from Dr. J. M. Browne, acting medical officer of health, that the death certificate was filled up thus: 1. (*a*) Heart failure; (*b*) card. vasc. degen. 2. Small-pox (vacc. in infancy); no P.M.

AUSTRALASIA.

(FROM OUR OWN CORRESPONDENT.)

Training of Crippled Children.

THE Rotary Club of Sydney adopted as its major activity for 1928–29 the educational and vocational training of crippled children. A committee was formed to make a survey of the Sydney metropolitan area to ascertain the number of crippled children and to arrange for clinics. Their inquiry showed a definite need and justification for such work. While skilful orthopædic surgeons were available, and hospital facilities, the educational opportunities were woefully lacking. The proper sequence, it was agreed, was first to locate the crippled child and lodge him in appropriate quarters; then to provide proper medical and surgical attention, and only after this to adopt any comprehensive educational measures such as vocational training. It was estimated that two or three thousand crippled children would be found in Sydney's population of roughly one million, and that 625 of these would require hospital care. In making recommendations the committee laid stress on the importance of avoiding any disturbance of the relations between the private physician and his patients. "It is unfair, unwise, and unethical," they say, "to embark upon any activity which fails to fully recognise the importance of proper measures to protect the incomes and livelihoods of the medical men concerned."

The New South Wales Society for Crippled Children has now been formed to carry on the work started by the Rotary Club, and has formally taken over the funds, record books, office staff, and equipment of the Crippled Children's Service Committee. Clinics have been established for advising patients whether treatment is likely to be of service, and for directing them to the best means of obtaining treatment. They do not carry out treatment themselves, recognising that the existing services are able to cope with all cases.

Post-graduate Work in Sydney.

Post-graduate instruction in Sydney has hitherto been wholly inadequate. Occasionally courses have been given by various bodies, but no systematic organisation has been attempted. In Melbourne a special post-graduate committee has been conducting courses for some years with great success, and has each year invited over-seas lecturers to give courses on special subjects. The activity and success of the Melbourne committee has been in marked contrast to the apathy in Sydney. The New South Wales branch of the British Medical Association has now taken steps to remedy this unsatisfactory state of affairs, and has formed a Post-graduate Work Committee. A general revision course for country practitioners is to begin on May 24th, and it is hoped that courses in special subjects can be arranged.

Man-eating Sharks.

Not long ago a young man bathing off Middle Brighton Pier at Melbourne was carried off by a shark, and his fate has led to an investigation of protective measures by the Surf Life-saving Association. At Melbourne this is the first death of the kind since 1876. Bathing in Tasmania is said to be free from all risk; in Sydney, on the other hand, there have been accidents of the kind sporadically every

season, and they are also reported from Queensland. Considering the millions of bathers who throng the various surfing beaches each summer, the risk to any individual is infinitesimal, but in certain places it has been thought worth while to build shark-proof fences on the beaches. Whilst harbour bathing has always been known to be dangerous on account of sharks, it is only within comparatively recent years that bathers on the surfing beaches have been attacked.

Not very much is yet known of the habits of the man-eating sharks. Recently a company has been formed known as the Marine Industry Limited, for the purpose of catching sharks and treating them for commercial purposes, and there is no doubt that its work will considerably add to our knowledge of the types of shark present, their location, and their habits.

This company has been operating in the Port Stephens district, and has found that the following sharks are the most common in their order of prevalence: the whaler (*Carcharhinus macrurus*), the grey nurse (*Carcharias arenarius*), the tiger shark (*Galeocerdo arcticus*), and the white shark (*Carcharodon carcharias*). Actually the shark most often caught is the Port Jackson shark (*Heterodontus philippi* and *Gyropleurodus galeatus*), whilst carpet sharks (*Orectolobus devisi*) and wobbegongs (*O. maculatus*) are almost as prevalent as the grey nurse.[1] The Port Jackson, the wobbegong, and carpet shark and also the seven-gilled shark (*Notorhynchus pectorosus*) are not regarded as man-eaters. The whaler, grey nurse, tiger shark, the white shark, and also the hammer-headed shark (*Sphyrna zygæna*) and blue-pointer (*Isurus glaucus*) are all held to be dangerous to man. It is interesting to note that shark attacks are unknown in American waters, although the white shark, the hammer-headed shark, and a species closely allied to the Australian grey nurse, occur there.

There is some difficulty in getting correct information about the type of shark concerned in any particular accident, owing to the rapid movements and the absence of competent observers. Attacks appear to be more frequent in the early morning and late afternoon, and particularly on dull days. It has been stated that mating time is the dangerous period—i.e., about February and March. Lone bathers are particularly liable to attack. As a rule the victim is brought ashore, but even then the death-rate from shark-bite is very high. The wounds are of two kinds—those actually caused by the bite, and others caused probably by the impact of the body and the fins. Most of the wounds have been on the legs; either the foot and part of the leg has been completely severed, or large parts of the thigh or buttock have been bitten off. Some idea of the power of the bite can be gained from a case in which a large portion was removed from the loin at the level of the crest of the ilium; part of this bone was taken in the bite, the bone being removed flush with the soft parts. The hand and forearm have been taken off, but this does not often happen. Bites actually on the body are uncommon on those admitted to hospital. Of those bitten, many die very rapidly from hæmorrhage, and those who survive this generally die either from shock or gas gangrene. In almost all those who have recovered, the bite has been on a limb which has required amputation later. Amputation of the limb or complete excision of the bite, where amputation is not possible, seems to offer the best chance of recovery.

It has been suggested that the patient should be kept at the beach casualty room, until shock has been treated, before removal to hospital. This presents many difficulties, and the Surf Life-saving Association holds that expert medical and nursing attention in hospital should be secured as soon as hæmorrhage has been dealt with. This should be done at the water's edge, and the patient should be transferred to hospital as soon as his condition will allow of it. The hospital should be previously notified so that immediate arrangements can be made for blood transfusion.

[1] Roughley, T. C.: Austral. Museum Magazine, 1928, iii., No. 5.

BERLIN.

(FROM OUR OWN CORRESPONDENT.)

An Epidemic of Trichinosis.

AN outbreak of trichinosis in Stuttgart, Würtemberg, has been traced to bear's ham served to the guests of a restaurant. The ham was that of a polar bear belonging to a small circus which did not prosper and was therefore dissolved. The proprietor of the restaurant bought the bear, which was apparently sound, and put bear's ham on the bill of fare. The meat was very much enjoyed by his clients, but those who had eaten of it complained some time afterwards of severe muscular pain; fever developed and they had to be taken to hospital, where the nature of the disease was eventually ascertained. Eventually more than 70 people were taken ill, and ten of them died, including the proprietor of the restaurant and his wife. There is some astonishment among the public that it is possible to have such an epidemic of trichinosis, which has almost disappeared in Germany as a result of the careful meat inspection. It is stated, however, that there is a gap in the law, in that game is not liable to examination, and the proprietor of the restaurant was thus within his rights to sell the meat without inspection. According to veterinarians bears often suffer from trichinosis, and though the flesh of these animals is very seldom eaten in this country, meat inspection should be extended to it.

Medical Education.

The Berlin Medical Chamber has been discussing the reform of medical study and of medical examinations. This subject is of interest to medical men in general, since the overcrowding of the profession is partly due to the unsatisfactory system of examination. Dr. His, professor of clinical medicine and head of the first medical clinic of the university, said he thought medical students should have enough knowledge of Latin to enable them to understand the terms which are international and have partly been used for centuries. Formerly only students coming from a public school where Latin and Greek are taught were admitted to medical study, but for some time pupils of schools without classical instruction have been able to matriculate as medical students. Prof. His also spoke against the proposal to separate medical study from the university, and set up special medical schools. Examination and study, he said, should be arranged according to the requirements of general practice and special training should be reserved for the period of assistantship after qualification. Medicine, surgery, and obstetrics should be the nucleus of study and examination, and time should be devoted to the study of special branches only so far as they are of use to the general practitioner. The medical students should be trained in nursing too. In the first term he should be taught physics, chemistry, and biology, but in separate courses and not alongside students of chemistry and physics whose instruction is, of course, to be more extensive. An examination will follow, and if a student shows that he has no gift for natural science he should not be allowed to go on with his studies. After the second term an examination in anatomy and in physiology should be held, with similar consequences, and after this second examination seven terms of clinical study should follow. During the university vacations medical students should work as dressers and clinical clerks, and the year's practical work in hospital should be passed before and not (as hitherto) after, the final examination. In this way the examiner would be in a position to say whether the candidate had a practical and not only a theoretical knowledge of medicine.

Inguinal Lymphogranulomatosis.

Dr. Frey lately read a paper before the Berlin Medical Society on lymphogranulomatosis as a venereal disease. The symptoms, he said, are a torpid swelling of the inguinal glands, taking origin

from an erosion of the genitals. The venereal nature of the disease is proved by the fact that infection is often caused by sexual intercourse, the partner showing the same symptoms some time later. The diagnosis, according to Frey, is established by cutaneous reaction produced by attenuated bubonic pus as antigen. For the treatment antimonial preparations are recommended.

An Institute of Radiological Research.

An institute of radiological research has been opened in Berlin in connexion with the medical faculty of the university. The head of the new institution is Prof. Friedrich, who, at the same time, has been appointed ordinary professor of medical physics in the university. The premises were opened in the presence of the Minister for Education, who said that the Government intend also to set up an institute of radiotherapy, and that this would be done as soon as the necessary funds were available. The buildings include a physical department with the most modern rontgen and high-frequency apparatus, a biological and a chemical department, a lecture room, and a laboratory for testing radium preparations used in public hospitals.

PARIS.

(FROM OUR OWN CORRESPONDENT.)

Recuperated Bath Water.

THE conduct of a thermal establishment at the popular resort of St. Nectaire has been the subject of legal investigation. The place was bought some years ago by a Dutchman named Van Gerdinge, who with his family undertook its whole management. Some time later it was rumoured that the bathing plant had been reconstructed by the new owner so as to heat up again the bath water used by previous bathers, an economical arrangement which did not conform to the precise requirements of modern hygiene. On inquiry the police found a secret plant for re-heating the bath water, and the proprietor and his son were tried last week at the local police-court and sentenced to three months' imprisonment with an additional fine of about £1500. Compensation was awarded to the victimised clients to an amount varying between £12 and £90 each. An expert has been nominated by the Court to assess the amount of indemnity payable to the health resort.

Social Insurance.

Deputies being now quit of the Budget have set to work on the social insurance law. Both Chambers are due to rise shortly, and it is not quite certain that the law will have passed all its stages by the first of July, the date promised when the measure was postponed last January. The desired concessions to professional ethics have been made on all points in deference to pressure from the leaders of the profession.

An X Ray Martyr.

Dr. Robert Chaperon has died in Paris after a long illness occasioned by professonal exposure to X rays at the Hôpital Broussais, where he was radiologist and assistant in electroradiology to Dr. Laubry. Two days before his death he was visited by the new Minister of Public Health, accompanied by members of the hospital staff, who conferred on him the gold medal of the Assistance Publique. It is understood that his memory will carry the insignia of the Legion of Honour which was not awarded to him in his lifetime.

ENLARGEMENT OF BROOK HOSPITAL.—This transferred hospital at Shooters Hill, Woolwich, is to be enlarged by the London County Council at a cost of £50,000, one-half of which will be absorbed by a nurses' home. When this hospital is full 227 nurses will be required.

Correspondence.

"Audi alteram partem."

A UNIVERSITY DEGREE FOR THE GENERAL PRACTITIONER.

To the Editor of THE LANCET.

SIR,—General practitioners of the British Empire will welcome the practical results of the findings of the Post-graduate Medical Education Committee. It must surely be fully realised that the main object of the medical student is to get through his examinations. Those who can afford it—for the cost of the medical curriculum is, speaking generally, a severe strain of the finances of parents—may be able to spend further time and money in obtaining higher qualifications, but everyone is aware that at the time of qualification one knows very little, if anything, of practical medicine. It is only when one encounters practical problems, after qualification, that one begins to learn medicine in its various branches. This fact, although sufficiently obvious, has not been fully appreciated by the authorities, and concentration on the encouragement of practitioners—who after all, are treating the great proportion of the sick population—will result in the greatest benefit to medicine as a whole.

Registered medical practitioners will therefore welcome with pleasure the fact that the Ministry of Health is seeking, in addition to other great authorities, the support of the University of London and will rejoice that, at last, the case of the general practitioner is beginning to be considered, and the importance of encouraging his further education is being realised. In this scheme the University of London can, if it so desires, play a unique and important part in encouraging practitioners to continue to be students of medicine. It can, in a broad and tolerant spirit—by granting an M.D. Degree to registered medical practitioners of the British Empire of approved standing—i.e., those who have contributed, e.g., in their field of general practice, to clinical research, and who are of, let us say, at least ten years standing, and who have, after a course of study at the post-graduate medical school, passed a required examination suitable for a general practitioner—do much to make the post-graduate hospital a medical metropolis of the British Empire, and encourage practitioners to continue to remain students of medicine.

In this way the University of London can share in the scheme and feel that it is—by granting its degree to a registered medical practitioner of approved professional standing and attainments who has studied in its post-graduate medical school—assisting, practically and in a peculiar way, in the encouragement of post-graduate medical study by general practitioners.—I am, Sir, yours faithfully,

April 16th, 1930. M.D., M.R.C.P.

DISTRIBUTION OF TYPHUS VIRUS IN THE BLOOD.

To the Editor of THE LANCET.

SIR,—In a recent issue you called attention to the important section in the reportof the Medical Research Council dealing with the virus diseases. On p. 19 of that report it is stated that it was shown, before the war, that the virus of typhus does not float freely in the blood, but is contained in the white corpuscles. That was the conclusion originally arrived at by Nicolle, but it does not hold now. It was shown first by Kusama and subsequently by Bacot and Ségal that the virus is contained not in the leucocytes, but in the blood-platelets. And Bacot, with his brilliant technique, was able to produce the infection of lice per anum with platelets proved by the

subsequent occurrence of the typhus "Rickettsia" bodies in the gut. I am under the impression that Nicolle has since agreed with this determination of the true distribution of the virus in the blood. It is important to point out the above fact, not only in justice to the late Mr. Bacot's work, but because of its significant bearing in relation to the pathology and ætiology of the disease. Typhus is particularly a derangement of the reticulo-endothelial system, and it is from certain cells with this ancestry (megakaryocytes and monocytes), both of which are macrophagic, that the platelets are produced.

Incidentally, there is another rather misleading statement on the same page. Dealing with Dr. Andrewes's work on the in-vitro "cultivation" of a virus, the report says: "It can be proved that in a cultivation of this kind, the virus actually multiplies itself." That is, to my mind, exactly what has not been proved. As I pointed out in a recent letter to your columns (Jan. 25th, p. 211), the increase of a virus in tissue-cell "cultures" is by no means the same thing as multiplication, because there is the probability that the additional quantity of virus is produced by the living cells themselves and not actually by the virus, which is to be regarded—again, I say, most probably—as non-living and of the nature of an abnormal blood-digestive enzyme. Convinced as I myself am, from my studies of the nature of various inclusions, of the general truth of this theory, I have never said it is proved. Progress in science is hampered by saying that a thing is proved when such is not the case.

I am, Sir, yours faithfully,

April 16th, 1930. H. M. WOODCOCK.

A MANUAL OF FEVERS IN INDIA.

To the Editor of THE LANCET.

SIR,—In the issue of THE LANCET for Jan. 25th I notice a review of my book "Infectious Diseases and Other Fevers in India." I find that it is no review at all, and instead of pointing out whether the book is useful or not for whom it is intended, your reviewer starts criticising the whole material in an unfair spirit, setting out only the defects. Also he should realise that the book is not meant for himself or his like, and students in Great Britain, but is meant for our students and practitioners here. The discussion of yellow fever is included at length because of the ever-present danger of its being introduced in India after the construction of the Panama Canal, and it is frequently mentioned by the Government for their special works, such as the ruinous Back Bay reclamation, so as to provide isolation space. Also we have got in this hospital a special screened ward kept reserved for it. It is from this point of view, as well as from the similarity of the preventive measures (which form the main bulk of that chapter) to those of malaria (as regards mosquitoes), the most common type of fever prevailing in this country, that so many pages are devoted to it rather than to undulant fever, which is hardly noticed in this country. As a matter of fact it is by mistake only that my book was sent by the publishers to reviewers outside India, as we know that our point of view will never be considered by the people abroad, and specially in England.

I am, Sir, yours faithfully,

P. T. PATEL, M.D., M.R.C.P. Lond.,
Medical Superintendent, City Isolation
March 8th, 1930. Hospitals, Bombay, India.

HIGHLANDS AND ISLANDS MEDICAL SERVICE.

To the Editor of THE LANCET.

SIR,—Owing to the exhaustion of the Highlands and Islands (Medical Service) Fund, Parliament recently authorised an increase to the previous inadequate Treasury grant in order that the recommendations of the report of the Dewar Commission of 1912 may be carried out. One of the most important recommendations of that report was the institution of a contributory superannuation scheme for the medical officers of the above Service in the poor and remote single-practice areas where income from private practice is negligible and the medical officer's work is almost altogether national work. It is said that the late Board of Health had such a scheme considered, but that at the time the scheme, for financial reasons, could not be put into force. It is to be hoped, now the financial conditions are adequate, that a satisfactory scheme for superannuation of the medical officers will be granted by the Department in the interest of the efficiency of this essential medical service.

I am, Sir, yours faithfully,

April 23rd, 1930. VIATOR.

Obituary.

FRANCIS LEY AUGUSTUS GREAVES, O.B.E., F.R.C.S. ENG.

Mr. Frank Greaves had recently tried to curtail some of his professional activities on account of his health, but the news of his death on April 16th came as a shock to a wide circle of friends and medical colleagues. He was actively engaged in hospital and consulting practice until a few weeks ago.

Born at Derby 55 years ago, he was the son of a medical man, Dr. C. A. Greaves, who held the post of honorary physician to the Derbyshire Royal Infirmary. He entered St. Thomas's Hospital, and after a distinguished career as a student qualified as M.R.C.S. in 1897, and was appointed house surgeon. In 1898 he became assistant house surgeon, and in the following year house surgeon to the Derbyshire Royal Infirmary, which institution he was still serving at the time of his death. In 1902 he obtained the Fellowship of the Royal College of Surgeons and was appointed honorary surgeon to the Infirmary. Three years later he inaugurated the ear, throat, and nose department, acting as honorary surgeon in this specialty, and also as honorary surgeon in the general surgical departments. As an officer in the Territorial Force he went on active service at the outset of the war; and later his surgical abilities were fully employed as acting lieut.-colonel in charge of surgical divisions of the 26th and 74th General Hospitals in France.

Apart from his work at the Derbyshire Royal Infirmary, Greaves was consulting aural surgeon to the Derbyshire Hospital for Sick Children and consulting surgeon to the Whitworth Hospital, Darley Dale, and to the Ripley Cottage Hospital. He had a large consulting practice, both as a throat specialist and in general surgery, for more than twenty years, and was held in great esteem by the profession in and around Derby. His hospital work was of a high standard; his outstanding experience being in the surgery of the thyroid gland and the treatment of fractures. He was always an enthusiastic worker for the Derby Medical Society, and his life and work did much for the scientific side of medicine in the locality. At the time of his death he had just finished a year as chairman of the Derbyshire Division of the British Medical Association.

In 1906 Mr. Greaves married Constance May Rice, who, with their son, survives him.

ST. BARTHOLOMEW'S HOSPITAL NEW SURGICAL BLOCK.—This building will probably be completed during May. The ground floor is already finished and equipped, and was last week opened to the inspection of anyone who applies for a ticket. In the male ward there is an exhibition illustrative of the progress of surgery from the earliest times to the present day. Among the exhibits are instruments found at Pompeii, which bear a remarkable resemblance to some of those now in use.

Parliamentary Intelligence.

NOTES ON CURRENT TOPICS.

EASTER ADJOURNMENT.

PARLIAMENT adjourned on Thursday, April 17th, for the Easter Recess. Both Houses will reassemble on Tuesday, April 29th.

HOURS OF INDUSTRIAL EMPLOYMENT BILL.

On April 16th Miss BONDFIELD (Minister of Labour) introduced the Hours of Industrial Employment Bill, a measure "to regulate the hours of work in industrial undertakings." The Bill was read a first time.

HOUSE OF COMMONS.

TUESDAY, APRIL 15TH.

Sanitary Convention and Pilgrim Traffic.

Major GRAHAM POLE asked the Secretary of State for India whether the convention in respect of pilgrim traffic approved by the International Sanitary Conference, held in Paris in 1926, was signed by the representatives of India at the Conference; and whether it was the intention of the Government of India eventually to ratify this convention.—Mr. WEDGWOOD BENN replied: Yes, Sir. The International Sanitary Convention of 1926 which contained, inter alia, provisions regulating the pilgrim traffic, was signed by a representative of India but has not yet been ratified. The Government of India hope to reach a decision shortly.

Boy Workers in Coal-mines.

Mr. FREEMAN asked the Secretary for Mines how many boys under 16 were working down mines at the present day; and if he contemplated any action in the matter.—Mr. BEN TURNER replied: The number of boys under 16 years of age employed below ground in coal-mines in December, 1929, was about 29,000. With regard to the second part of the question, there is no present intention of introducing legislation on this subject.

Insured Persons and Sickness Benefit.

Sir FREDERICK HALL asked the Minister of Health the numbers of insured men per 100 who claimed sickness benefit in 1921 and 1927, respectively; the respective expenditure in the same two years for sickness and disablement benefits and the State treatment of disease; the cost per head of the population of England and Wales in 1921 and 1927, respectively, for national health insurance; the cost per head of that population for the same years for State medical treatment; whether the tendency was for expenditure on sickness benefit to decrease as expenditure on preventive and curative treatment increased; and if he would consider setting up a suitable body to inquire into the working of the Health Insurance Acts.—Miss SUSAN LAWRENCE (Parliamentary Secretary to the Minister of Health) replied: The information desired by the hon. Member is as follows: (1) According to a report recently furnished by the Government Actuary of the sickness and disablement benefit experience of a representative sample of the whole body of insured persons, the number of insured men per 100 who claimed sickness benefit in 1921 and 1927 was 14 and 23 respectively. (2) The amounts expended under the Health Insurance Acts in England and Wales in 1921 and 1927 in respect of (*a*) sickness benefit were £7,176,800 and £11,818,000 respectively; (*b*) disablement benefit were £2,689,600 and £6,368,000 respectively; (*c*) medical benefit were £9,394,800 and £8,772,500 respectively. In this connexion it is pointed out that the increase in the amounts expended on sickness and disablement benefits in 1927 as compared with the corresponding amounts expended in 1921, was to some extent due to the fact that in the later of those years there were larger increases in the benefit rates under the Societies schemes of additional benefits. (3) The cost per head of the population of England and Wales in 1921 and 1927 for national health insurance was 13*s.* 11*d.* and 18*s.* 8*d.* respectively, and of medical benefit provided under the Health Insurance Acts, 4*s.* 11½*d.* and 4*s.* 6½*d.* respectively. As regards the last two parts of the question I would refer to the reply given to Sir Kingsley Wood on April 10th. The factors which have contributed to the increases above noted are numerous and complex, and without further and fuller consideration my right hon. friend does not think it possible to make any general statement as to the relation between those facts and the increased provision of curative and preventive treatment to which the hon. Member refers.

Courses at Royal Naval Medical School, Greenwich.

Dr. VERNON DAVIES asked the First Lord of the Admiralty the number of courses provided at the Royal Naval Medical School, Greenwich; the maximum number of students which could be taught at each course; the number of entries for each course; the total cost of such courses for each of the last three years for which statistics were available; and the total amount of vaccine produced and distributed yearly during the same period.—Mr. AMMON (Parliamentary Secretary to the Admiralty) replied: There would normally be two courses a year at the Royal Naval Medical School, Greenwich, for acting surgeon lieutenants, but these are at present in abeyance. There are also normally two courses a year for surgeon lieutenant commanders. The maximum number of students who can be trained at any one time at the school is 12 officers and 12 ratings. The numbers who attended courses during the period 1927–29 are as follows:—

Officers.—1927, 5*; 1928, 6*; 1929, 7*.
Ratings.—1927, 4*; 1928, 1; 1929, 5.

* Includes one from Royal Australian Navy in each case.

When the shortage of naval medical officers is overcome, the numbers attending will approximate to the following figures annually: acting surgeon lieutenants (two courses), 24; surgeon lieutenant commanders (two courses), 24. The approximate amounts included in the estimates for the Royal Naval College, Greenwich, which can be attributed to the medical school are as follows: 1928, £9650; 1929, £9800; 1930, £9800. These amounts represent the cost not only of the above-mentioned courses of instruction, for which separate figures are not available, but also of a very large amount of highly technical work of the greatest importance to the health of the Navy. To enumerate some of this latter work, mention should be made of research work, analytical work of great variety, tropical disease investigations, special pathological examinations, &c., and lastly the very important work of vaccine making. The total amounts of vaccine produced and distributed yearly during the last three years are as follows: 1927, 102,360 c.cm.; 1928, 95,060 c.cm.; 1929, 102,830 c.cm.

British Post-graduate Hospital and Medical School.

Mr. MATTERS asked the Minister of Health whether, in connexion with the British Post-graduate Hospital and Medical School, facilities would be provided whereby foreign medical men and women might secure a British post-graduate degree supplementary to, and based on recognition of, the diplomas secured by them in their own countries.—Mr. GREENWOOD replied: The question of the grant of medical degrees is not one which it rests with the Minister of Health to determine; and consideration of the matter in the present connexion would appear to be premature pending the establishment of the British Post-graduate Hospital and Medical School.

Sanitary Conditions in the Hop Districts.

Sir BASIL PETO asked the Minister of Health how many local authorities had improved their code of by-laws during the previous two years with reference to the sanitary conditions that existed through the hop-picking season; and whether any further improvements had been suggested by his department to local authorities for the forthcoming season.—Mr. GREENWOOD replied: Since the beginning of 1928 16 local authorities have made new series of by-laws on this subject. In nine cases the by-laws amended those formerly in force and in the remaining seven no by-laws had previously been made. The question whether any further suggestions can be made for the improvement of conditions during the forthcoming season is receiving my consideration.

Hospital Accommodation for Becontree.

Mr. MARCH asked the Minister of Health if he was aware that a public appeal was being made for funds to erect a hospital to meet the needs of the new residential centre at Becontree created by the London County Council; and would he in future, when sanctioning housing schemes, take into consideration the hospital accommodation in or near the area of the housing scheme.—Mr. GREENWOOD replied: The answer to the first part of the question is in the affirmative. It is only in quite exceptional cases such as that mentioned by my hon. friend that the transference of population involved in a housing scheme would be such as to make it necessary to give special consideration to the hospital accommodation in or near the area of the scheme, but the point will not be overlooked in any comparable cases.

WEDNESDAY, APRIL 16TH.

Rejection of Army Recruits on Medical Grounds.

Major GLYN asked the Secretary of State for War the percentages of men offering themselves for enlistment in the

Army and who were rejected on the main physical defects falling into the eight different categories; and how these percentages compare with those of the four years 1920 to 1924 and for the four years prior to the war.—Mr. T. SHAW replied: The ratio per 1000 candidates for enlistment rejected by the examining medical officers for the following physical defects was as follows:—

Disability.—A = Diseases of middle ear. B = Loss or decay of many teeth. C = Defects of Lower Extremities. D = Defective vision. E = Diseases of the Heart. F = Insufficient weight. G = Flat feet. H = Under chest measurement.

—	1910	1911	1912	1913	1921	1922	1923	1924	1929
A ..	6·35	6·58	7·25	8·26	11·71	15·53	24·73	31·65	50·21
B ..	56·95	26·05	22·44	21·08	35·16	49·98	48·49	36·13	26·13
C ..	18·74	20·05	15·59	12·01	11·58	17·40	29·13	33·86	33·73
D ..	18·15	21·07	21·08	21·97	58·39	52·50	38·94	30·54	26·69
E ..	40·38	41·24	37·01	28·67	37·87	32·38	44·84	53·42	43·56
F ..	5·34	8·07	3·62	10·21	11·89	9·85	10·73	22·69	24·50
G ..	10·44	8·12	7·30	5·49	27·22	26·99	27·44	23·17	16·90
H ..	43·97	30·47	29·23	18·03	33·39	47·49	28·92	20·85	10·58

Salaries of Coroners.

Mr. EBENEZER EDWARDS asked the Home Secretary the salary and emoluments of the coroners in Northumberland and the city of Newcastle-on-Tyne.—Mr. SHORT replied: The coroners in question are remunerated by salary only. As their salaries may be fixed by agreement my right hon. friend is not always in possession of the current figures. The amounts in 1929 were: Northern District, £300; Southern District, £600; Berwick-on-Tweed Borough, £50; Newcastle-on-Tyne County Borough, £850.

Psittacosis.

Mr. WEST RUSSELL asked the Minister of Health the number of cases of psittacosis reported during the present year; the number of these which had been fatal; and whether he was satisfied that adequate steps had been taken to deal with this matter.—Miss S. LAWRENCE replied: Information has been received in the Ministry of Health of 80 cases of illness which commenced during the present year and in which the patients had been associated with sick parrots. Thirteen of these cases proved fatal. It is not possible for my right hon friend to say definitely how many of these persons were, in fact, suffering from psittacosis, but in nine of the fatal cases psittacosis appeared on the death certificate as a cause of death. The answer to the last part of the question is in the affirmative.

THURSDAY, APRIL 17TH.

Heating of School Rooms.

Mr. MARJORIBANKS asked the President of the Board of Education whether he had obtained records for consideration as to the effect upon the health and vitality of the children of central heating, open-fire heating, or no heating, respectively, in elementary school rooms.—Sir CHARLES TREVELYAN replied: I have not obtained records on these points, and I should doubt whether they would lead to any modification of the now generally accepted view that, in normal circumstances, some form of central heating is the most suitable system for schools.

Supply of Milk to School-children.

Mr. ROSBOTHAM asked the President of the Board of Education how many scholars in the elementary schools of England and Wales were being supplied daily with milk; if he was satisfied with the reports received as to the benefits derived; and, if so, if he would give every encouragement to local education authorities to extend the system.—Sir CHARLES TREVELYAN replied: The National Milk Publicity Council estimate that about 350,000 school-children are now receiving milk under their schemes. I am not able to say how many children are receiving milk under arrangements made by the local education authorities, but I am taking steps to obtain this information. The reports received as to the benefits derived by the children are very satisfactory. I am anxious to give every encouragement to the extension of the movement in the schools, and I am now considering the most effective means by which I can do so.

Mr. MCSHANE asked whether any grants for this purpose had been made from the Exchequer?

Sir. C. TREVELYAN: Certainly, where the local authorities have spent the money they have got the grant.

Mr. SMITHERS: What steps are being taken to see that this milk is free from tuberculosis?

Sir C. TREVELYAN: I believe the National Milk Publicity Council are very particular about this matter.

Mr. FREEMAN: Is the right hon. gentleman in favour of every child having this daily supply of milk?

Sir C. TREVELYAN: I should be very glad to see it.

Milk and Tuberculosis.

Mr. SMITHERS asked the Minister of Health what progress was being made to ensure that milk supplied to the public should be free from tuberculosis; if he had consulted members of the medical and veterinary professions; what other inquiries he had made; and briefly the present position and what further action he proposed to take.—Mr. GREENWOOD replied: I understand that an increasing number of local authorities are carrying out regular veterinary inspections of cattle and having samples of milk tested for tubercle bacillus, with a view to the exercise of their powers under the Milk and Dairies Act. I am not proposing to introduce any further legislation on this subject at the present time, but I am in consultation with my right hon. friend, the Minister of Agriculture and Fisheries, with a view to the issue of a circular to local authorities indicating the further steps which they might advantageously take under existing powers. For this purpose I shall, of course, have regard to the views of the medical and veterinary advisers of the two departments, as well as those of other members of the two professions who have communicated with my right hon. friend and myself.

Mr. SMITHERS: In view of the national importance of getting the milk-supply free from tuberculosis, especially for the children in school, will the right hon. gentleman take steps to speed up this inquiry and to ensure that the milk supplied should, as far as possible, be free from tuberculosis?

Mr. GREENWOOD: I hope the circular will be issued to local authorities very shortly.

Liquid and Dried Eggs from China.

Mr. RAMSBOTHAM asked the Minister of Health whether he was satisfied that the imports of liquid and dried eggs from China were free from contamination and without danger to public health; what was the value of such eggs annually imported in these two forms; and for what purposes they were chiefly used.—Mr. GREENWOOD replied: So far as I am aware these imports are free from contamination and if they arrive in good condition are without danger to the public health. They are required to be free from preservatives, and in common with other imported foods they are subject to inspection at the port of entry and may be seized and destroyed if they are found to be unsound, unwholesome, or unfit for human consumption. The value of such eggs imported from China during the year 1929 was £3,574,640. I understand that these eggs are mainly used by the baking trade for cake-making.

Sewage Disposal in Mitcham District.

Mr. MELLER asked the Minister of Health whether he was aware of the inadequate provision made for the disposal of sewage in the districts of Mitcham, Beddington, and Wallington, and Merton and Morden, inasmuch as the present works were only capable of dealing with a population of 80,000, whereas the population was now approximately 115,000 and was rapidly increasing, particularly in the district of Merton and Morden which contained a part of the St. Heliers estate; that a scheme to enlarge the works had been under consideration by the Ministry since June last and was still awaiting sanction; if he could give reasons for the delay and see that steps were immediately taken to safeguard the health of the districts affected.—Mr. GREENWOOD replied: I am aware of the need for improvement of the arrangements for disposing of the sewage of the districts in question, and I have under consideration a scheme for this purpose, the estimated cost of which is £174,000. In view, however, of the inquiry which is now proceeding into the whole question of sewerage and sewage disposal for the Greater London area, the present scheme must be regarded as part of a larger problem, and I am anxious that no expenditure on works at the present site should be incurred which can be avoided by the substitution of alternative arrangements to those submitted. My decision is, therefore, being deferred pending the result of further investigations. I am not aware that there is danger to health, but the hon. Member can rest assured that there will not be any avoidable delay in dealing with this difficult problem.

Hours of Industrial Employment Bill.

Mr. TOUT asked the Minister of Labour whether the Hours of Industrial Employment Bill would enable the Washington Hours' Convention to be ratified.—Miss BONDFIELD replied: The Hours of Industrial Employment Bill does not apply to underground workers in coal-mines, whose hours are the subject of another Bill now before Parliament. As regards all other workers covered by the Washington Hours Convention I am advised that the Hours Bill fulfils the requirements of the Convention.

Treatment of Tuberculosis in Kent.

Captain BALFOUR asked the Minister of Health the number of beds available in the county council of Kent institutions

for pulmonary tuberculosis; the number of patients awaiting admission for this disease on Jan. 1st, Feb. 1st, and March 1st, 1930; if the proportion of waiting subjects to available beds was considered satisfactory by the Ministry of Health; and, if not, whether he would take steps to improve this state of affairs.—Mr. GREENWOOD replied: The average number of beds available in 1929–30 under the scheme of the Kent County Council for the treatment of pulmonary tuberculosis was 364, of which 155 were in institutions provided by the county council. The numbers of persons suffering from pulmonary tuberculosis who were awaiting admission to residential institutions were 74, 60, and 72, on Jan. 1st, Feb. 1st, and March 1st respectively, but the number so waiting had been reduced to 50 on April 1st. The proportion which that number bears to the number of available beds is slightly higher than for the country as a whole, but I am informed that the average waiting period in Kent is approximately one month only. I understand that the County Council are giving consideration to this matter, and that they propose, as a temporary measure, to reduce the waiting-list by the use for suitable cases of accommodation in the poor-law institutions which were transferred to them on April 1st.

Medical News.

UNIVERSITY OF LONDON: *University College*.—A course of six lectures on Special Sense Physiology will be given at the College by Dr. R. J. Lythgoe at 5 P.M. on Thursdays and Tuesdays, from May 15th to June 3rd.

UNIVERSITY OF LONDON MEDICAL GRADUATES SOCIETY.—The annual dinner and meeting of this society will be held at the Langham Hotel, Portland-place, W., on Tuesday, May 13th, at 7.30 for 7.45 P.M. The President, Sir StClair Thomson, will be in the chair. Applications for tickets should be sent to the hon. secretaries of the society at 11, Chandos-street, W.1.

ABERDEEN UNIVERSITY CLUB, LONDON.—The eighty-third half-yearly dinner will be held at the Trocadero Restaurant on Thursday, May 15th, with Prof. J. J. R. Macleod, F.R.S., in the chair. Dr. Leonard Hill, F.R.S., will be the guest of the club. The hon. secretary's address is 9, Addison-gardens, W.14.

INDIAN MEDICAL SERVICE DINNER.—The annual dinner of the Indian Medical Service will be held at the Trocadero Restaurant, Piccadilly-circus, London, on Wednesday, June 18th, at 7.15. Major-General F. G. H. Hutchinson has been invited to take the chair. Tickets and all particulars may be had from the joint hon. secretary, Sir Thomas Carey Evans, 31, Wimpole-street, W.1.

BRITISH INSTITUTE OF PHILOSOPHICAL STUDIES.—Six lectures on Æsthetic Philosophy will be given by Prof. Lascelles Abercrombie, beginning on Monday, May 5th, at 5.30 P.M. Particulars may be had from The Director of Studies, 88, Kingsway, London, W.C. 2.

CIVIL SERVICE NURSING AID ASSOCIATION.—At the first annual meeting recently it was reported that more than 2800 persons had applied for membership of this association, that claims under this scheme were already being received, and that a number had been paid.

ROYAL NORTHERN HOSPITAL.—At the annual meeting the Marquess of Northampton stated that the accommodation for out-patients was designed for 40,000 attendances annually, but that now 230,000 have to be dealt with. Remodelling will cost £25,000, but there is already a debt of over £97,000.

LECTURES ON RADIUM.—Dr. John Murdoch, of the Brugmann Hospital, and director of the cancer centre of the University, Brussels, is shortly to visit this country to deliver lectures on radium therapy. At the Medical School, Leeds, at 3.30 P.M. on Wednesday, May 7th, he will give an address entitled: What Can We Expect from Radium in the Treatment of Cancer? Prof. J. F. Dobson will take the chair, and members of the medical profession who wish to attend are asked to inform the British Empire Cancer Campaign, 47, Park-square, Leeds, before May 6th. On Thursday the 8th, at 6 P.M. Dr. Murdoch will give a lecture at the British Institute of Radiology, 32, Welbeck-street, London, on Recent Advances in Radium Therapy, especially in regard to measurement of dosage. Practitioners who are interested are invited to attend. On the following day at 9 P.M. Lord Dawson will preside at a meeting at the Royal Society of Medicine, when Dr. Murdoch will speak on the Radium Treatment of Cancer.

WE regret to announce the death of Dr. F. E. Wynne, Medical Officer of Health for Sheffield and Professor of Public Health in the University.

MIDDLESEX HOSPITAL.—At the annual court of governors recently Prince Arthur of Connaught announced that more than two-thirds of the work of reconstruction has been completed, and that half the patients are back from the annexe and housed in the new west wing. Work will shortly be begun upon the block of 60 separate rooms for paying patients. The Hospital and the Cancer Hospital are to be amalgamated and the old title of the Middlesex Cancer Wing will be resumed.

NATIONAL HOSPITAL, QUEEN-SQUARE. — A post-graduate course on Diseases of the Nervous System will be held at this hospital from May 5th to June 27th. It will consist of lectures and demonstrations at 3.30 P.M. each weekday, except Wednesday and Saturday, with teaching in the out-patient department at 2 P.M. on each weekday except Saturday, and pathological lectures at noon on Mondays. Lectures on the Anatomy and Physiology of the Nervous System (Fridays at noon), and clinical demonstrations chiefly on Methods of Examination of the Nervous System (on Tuesdays and Thursdays at noon), are also being arranged. Application should be made to the Secretary, Medical School, National Hospital, Queen-square, London, W.C. 1.—The average weekly cost per occupied bed (1309 patients) was £3 7*s*. 10*d*., a reduction of 6*s*. 5*d*. The proposed extensions, to cost £46,000, are to begin within the next two years with the erection of a new pathological department, a surgical wing, and a new home for male nurses.

BIRMINGHAM HOSPITAL CENTRE.—The Lord Mayor of Birmingham has inaugurated an appeal for £1,250,000 for the establishment of the new hospital centre. The late and present Ministers of Health, Mr. Chamberlain and Mr. Greenwood, supported the appeal, and Mr. Amery pointed out that the money could be raised by each citizen of Birmingham giving a penny a week for five years. The city is at least 800 beds short of its needs, and the waiting-lists contain more than 3000 names.

PROGRESS OF CONTRIBUTORY SCHEMES.—Last year the contributory scheme of the Radcliffe Infirmary, Oxford, produced £33,514, an increase of considerably more than £2000.—The income of the Manchester and Salford Hospital Saturday and Convalescent Homes Fund was a fraction over £51,000, nearly double the figure of 1926.—The Salisbury and District Infirmary League raised slightly over £12,000, an increase of about £1000.

LONDON TEMPERANCE HOSPITAL.—On the ground that the great majority of the in-patients come from beyond inner London, the name of this institution has been changed to "The National Temperance Hospital." Last year 1418 patients were treated to a conclusion; they remained on an average 29 days at an average weekly cost of £3 15*s*. 7*d*. The new building, which will cost £35,000, is shortly to be begun, though only £11,000 is available. It is hoped to augment the income by enlarging the private nursing institute.

Medical Diary.

SOCIETIES.

ROYAL SOCIETY OF MEDICINE, 1, Wimpole-street, W.

MONDAY, April 28th.—8 P.M., ODONTOLOGY. Casual Communications: Mr. F. Coleman: Buried Mandibular Teeth with Crowns in Occlusion. Mrs. May Mellanby: Some Further Investigations on Man and Animals into the Causes of Dental Disease, with Special Reference to Factors Controlling the Resistance of the Dental Tissues to Harmful Agencies.

WEDNESDAY.—8.30 P.M., UROLOGY: Prof. Hugh Young, (Johns Hopkins): The Advantages of the Perineal Route in the Treatment of Various Diseases of the Prostate.

THURSDAY, May 1st.—8 P.M., TROPICAL DISEASES. Election of Officers and Council. Papers: Dr. Aldo Castellani: A Little Known Type of Chronic Colitis. Dr. J. B. Christopherson: Treatment of Bilharzia in Children.

FRIDAY.—10.30 A.M., OTOLOGY. (Cases at 9.30 A.M.) Election of Offices and Council. Papers will be read by Prof. M. Sourdille (Paris) and Mr. G. J. Jenkins. Cases and specimens will be shown by Dr. K. W. Mackenzie and others. 5 P.M., LARYNGOLOGY. (Cases at 4 P.M.) Election of Officers and Council. 8.30 P.M., ANÆSTHETICS. Election of Officers and Council. Short Paper: Dr. R. J. Clausen: Ethylene Anæsthesia. A discussion will follow and Members are invited to relate interesting or instructive cases.

LECTURES, ADDRESSES, DEMONSTRATIONS, &c.

ROYAL COLLEGE OF PHYSICIANS, Pall Mall, S.W.
TUESDAY, April 29th.—5 P.M., Prof. J. J. R. Macleod: Diabetes as a Physiological Problem (First Oliver-Sharpey Lecture).
THURSDAY, May 1st.—5 P.M., Prof. Macleod (Last Oliver-Sharpey Lecture).

NORTH-EAST LONDON POST-GRADUATE COLLEGE, Prince of Wales's General Hospital, Tottenham, N.
MONDAY, April 28th.—2.30 to 5 P.M.: Medical, Surgical, and Gynæcological Clinics. Operations.
TUESDAY.—2.30 to 5 P.M.: Medical, Surgical, Ear, Nose, and Throat Clinics. Operations.
WEDNESDAY.—2.30 to 5 P.M.: Medical, Skin, and Eye Clinics. Operations.
THURSDAY, May 1st.—11.30 A.M.: Dental Clinics. 2.30 to 5 P.M.: Medical, Surgical, Throat, and Ear Clinics. Operations.
FRIDAY.—10.30 A.M.: Ear, Nose, and Throat Clinics. 2.30 to 5 P.M., Medical, Surgical, and Children's Diseases Clinics. Operations.
On Thursday, at 4.30 P.M., Dr. F. D. Howitt will give a special lecture on Chronic Rheumatism.

ST. MARY'S HOSPITAL INSTITUTE OF PATHOLOGY, W.
THURSDAY, May 1st.—5 P.M., Prof. John Mellanby: Absorption from the Alimentary Canal.

ST. THOMAS'S HOSPITAL MEDICAL SCHOOL, S.E.
THURSDAY and FRIDAY, May 1st and 2nd.—5.30 P.M., Dr. H. Leslie-Roberts: Some Biological Aspects of the Human Skin.

CITY OF LONDON MATERNITY HOSPITAL, City-road, E.C.
TUESDAY, April 29th.—5 P.M., Mr. R. Christie-Brown: The Causes and Treatment of Delay in the First Stage.

MANCHESTER ROYAL INFIRMARY POST-GRADUATE COURSE.
TUESDAY, April 29th.—4.15 P.M., Dr. E. B. Leech: Ward Experiences of Carcinoma of the Stomach.
FRIDAY, May 2nd.—4.15 P.M., Dr. T. H. Oliver: Demonstration of Medical Cases.

GLASGOW POST-GRADUATE MEDICAL ASSOCIATION.
WEDNESDAY, April 30th—4.15 P.M. (at the Royal Hospital for Sick Children), Dr. Geoffrey Fleming: Medical Cases.

Appointments.

BROWNE, HELEN M., M.B., B.S. Lond., has been appointed Resident Anæsthetist to the Queen Charlotte's Maternity Hospital.

Westminster Hospital Medical School: BIELENKY, D., L.R.C.P. Lond., M.R.C.S., Senior Resident and Casualty Officer; FIRMIN, D. P., L.R.C.P. Lond., M.R.C.S., Resident House Physician; WILLIAMS, A. W., M.B., Ch.B. Camb., Resident House Surgeon; RODGERS, T. S., L.R.C.P. Lond., M.R.C.S., Resident Obstetric Assistant and House Physician to the Children's Department.

Certifying Surgeons under the Factory and Workshop Acts: BISSET, A., M.B., Ch.B. Aberd. (Heywood, Lancaster); and SMALLEY, E., M.B., Ch.B. Edin. (Bury, Lancaster).

Vacancies.

For further information refer to the advertisement columns.

Aylesbury, Royal Buckinghamshire Hospital.—Res. M.O. At rate of £200.
Basingstoke, Hants, Park Prewett Mental Hospital.—Jun. Asst. M.O. £350.
Bath, Royal United Hospital.—H.S., Asst. H.S. At rate of £150 and £100 respectively. Also H.P. £120.
Birmingham City, Maternity and Child Welfare Dept., City Babies' Hospital.—Res. M.O. At rate of £150. Also Three Temporary M.O.'s. 10 guineas weekly.
Blackburn Royal Infirmary.—3rd and 4th Res. H.S.'s. £175 and £150 respectively.
Bolingbroke Hospital, Wandsworth Common, S.W.—H.S. At rate of £120.
Bootle General Hospital, Derby-road.—Jun. H.S. At rate of £150.
Bradford Royal Infirmary.—H.S. £150.
Bristol City and County.—Asst. M.O.H. £600.
Bristol Eye Hospital.—Jun. H.S.
Bristol, Nordrach-upon-Mendip Sanatorium, Blagdon.—A.M.O.
Bristol Royal Infirmary.—H.P. At rate of £60.
Burnley, Victoria Hospital.—H.P. At rate of £150.
Burton-on-Trent General Infirmary.—2nd Res. H.S. £150.
Canterbury, Kent and Canterbury Hospital.—H.P. At rate of £125.
Charing Cross Hospital, W.C.—Physician for Mental Disorders.
Chester, County Mental Hospital.—Jun. Asst. M.O. £350.
Connaught Hospital, Orford-road, E.—Sen. Res. H.S. At rate of £150. Jun. Res. H.S. At rate of £100.
Derbyshire Royal Infirmary.—Ophth. H.S. and Res. Anæsthetist. £150.
Gloucestershire Royal Infirmary and Eye Institution.—2nd H.S. At rate of £100.
Great Yarmouth General Hospital.—Jun. H.S. At rate of £125.
Hammersmith Metropolitan Borough.—Tuberculosis Officer, &c. £750.
Hastings, Frederick-road Infirmary.—M.O., &c. £450.
Hospital for Sick Children, Gt. Ormond-street, W.C.—Res. M.O. for Country Branch Hospital, Tadworth. At rate of £250.
Hospital of St. John and St. Elizabeth, 60, Grove End-road.—Res. H.P. At rate of £100.
Hove, Lady Chichester Hospital.—Jun. H.P. At rate of £50.
Huddersfield County Borough.—M.O.H., &c. £1100.
Jerusalem, St. John Ophthalmic Hospital.—Registrar.
King Edward Memorial Hospital, Ealing, W.—Sen. H.S. and Jun. H.S. At rate of £150 and £100 respectively.
Leicester Royal Infirmary.—Hon. Surgeon.
Liverpool, Alder Hey Children's Hospital, West Derby.—Res. Asst. M.O. At rate of £200.
Liverpool and District Hospital for Diseases of the Heart.—H.P. At rate of £52.
London Jewish Hospital, Stepney Green, E.—Hon Reg. to Ear, Nose and Throat Dept. Also Res. M.O. and Jun. Res. M.O. At rate of £150 and £100 respectively.
Manchester Royal Children's Hospital, Gartside-street.—Sen. M.O. £300.
Manchester Royal Infirmary, Roby-street.—Jun. H.S. and Cas.O. £100.
Montrose Royal Asylum.—Asst. M.O. £325.
Oldham County Borough.—Asst. M.O.H. and Clin. Tub.O. £750.
Plymouth, City and Port of.—Asst. M.O.H. £750.
Portsmouth, St. Mary's Hospital, &c.—3rd Asst. Res. M.O. £250.
Prince of Wales's General Hospital, Tottenham, N.—Hon. Asst. Phys.
Roxburgh County Council.—Locum Tenens for Clinical Tuberculosis O. £10 10s. weekly.
Royal Chest Hospital, City-road, E.C.—Res. M.O. and H.P. At rate of £150 and £100 respectively.
Royal College of Surgeons.—Hon. Asst. Dental Surgeon.
Royal Eye Hospital, St. George's Circus, Southwark, S.E.—H.S., and Asst. H.S. At rate of £150 and £100 respectively.
Royal Free Hospital, Gray's Inn-road, W.C.—Asst. Surg. to Ear, Nose and Throat Dept.
St. Thomas's Hospital.—Sen. M.O. in Venereal Dept. £675.
Salford City.—Asst. M.O. for Maternity and Child Welfare. £600.
Salford Royal Hospital.—H.P. Also Cas. H.S. Each at rate of £125.
Sheffield Royal Hospital.—Res. Ophth. H.S. Also Res. Anæsthetist. Each at rate of £80.
Sheffield Royal Infirmary.—Asst. Cas. O. At rate of £80.
Southampton, Royal South Hants and Southampton Hospital.—Cas. O. At rate of £160.
Southern Rhodesia Medical Service.—Three Asst. and Relieving Government M.O.'s. £500.
University College, Gower-street, W.C.—Bayliss-Starling Memorial Scholarship. £120.
Wakefield, Clayton Hospital.—Two H.S.'s. Each at rate of £200.
Wakefield, Middleton-in Wharfedale Sanatorium.—Res. Asst. M.O. £350.
West London Hospital, Hammersmith, W.—Hon. Surg.
Winchester, Royal Hampshire County Hospital.—Hon. Ophth. S.
Worcestershire County Council.—Asst. County M.O. £600.

The Chief Inspector of Factories announces a vacancy for a Certifying Factory Surgeon at Markinch (Fifeshire).

Births, Marriages, and Deaths.

BIRTHS.

ALLCHIN.—On Easter Day, 1930, at 48, Birch-grove, Acton, to Louise Maude, wife of F. M. Allchin, M.B. Lond.—a son.
COWAN.—On Feb. 8th, at Aurora-terrace, Wellington, New Zealand, the wife of Dr. A. F. Cowan, of a daughter.
FORD.—On April 11th, at The Goffs, Eastbourne, the wife of Dr. J. N. C. Ford, of a daughter.
KELLY.—On March 15th, at a nursing home, Bangor, the wife of Wing Commander T. J. Kelly, *M.C.*, M.D., R.A.F. Medical Service, Sarafand, Palestine, of a son.
MCCOWAN.—On April 15th, the wife of P. K. McCowan, M.D., "Velindre," Whitchurch, Glam., of a daughter.
SMITH.—At 5, Cavendish-terrace, Stanwix, Carlisle, on April 9th, to Gwendoline (née Chave), wife of Dr. J. N. Douglas Smith—a son.

MARRIAGES.

LEE—SIMPSON.—On April 14th, at St. Augustine's, South Kensington, Dr. Sidney Lee, of Teddington, to Mary Egerton Simpson, of Hampton Wick.

DEATHS.

BRIDGES.—On April 21st, at Chilswell, near Oxford, after a short illness, Robert Seymour Bridges, O.M., M.B., F.R.C.P., LL.D., Poet Laureate, in his 86th year.
CAPELL.—On April 13th, suddenly at High-street, Abertridwr, South Wales, John Capell, M.R.C.S., L.R.C.P., M.B., B.S. Lond., late of Blackheath and Edgware-road.
GIUSEPPI.—On April 19th, 1930, after many years' illness and suffering, Grace Mann Giuseppi, much beloved wife, and devoted friend for forty years, of Dr. P. Eugene Giuseppi, J.P. (Government Medical Officer, Trinidad, B.W.I.—retired), 28, Fawcett-street, West Brompton, London, S.W.10.
GREAVES.—On April 16th, 1930, suddenly, Francis Ley Augustus Greaves, F.R.C.S., of 83, Friar-gate, Derby, dear husband of Constance May Greaves, aged 55 years.
INMANN.—On April 17th, Robert Matthews Inmann, L.R.C.P. Lond., L.R.F.P.S. Glasg., L.S.A., of Brighton-road, Stoke Newington, N., aged 95.
WOOL-LEWIS.—On April 19th, suddenly, at Plymouth, Dr. Ernest Wool-Lewis.

N.B.—A fee of 7s. 6d. is charged for the insertion of Notices of Births, Marriages, and Deaths.

Notes, Comments, and Abstracts.

ABSINTHE AND ABSINTHE DRINKING IN ENGLAND.

BY C. W. J. BRASHER, M.D.,
FORMERLY MEDICAL SUPT., RENDLESHAM HALL, SUFFOLK.

MANY readers of this journal may regard an article on absinthe and its dangers as superfluous, being unaware that this liqueur, of which the manufacture and sale have been prohibited in France, Belgium, Switzerland, Italy, Germany, and Bulgaria, is still manufactured and exported to England. I have been informed by a member of an exclusive London club that when a cocktail is ordered it is customary to inquire whether a "spot" shall be added—that "spot" being absinthe. Another London clubman states that "the cocktail 'with a kick in it' is often ordered by the more hardened cocktail drinker" and that the "kick" is obtained by the addition of an extra quantity of the basic spirit (gin, whisky, brandy, or rum) of the cocktail or of a variable amount of absinthe. A third patient states that "when in my club a cocktail is ordered, the waiter inquires 'with or without?'—i.e., with or without absinthe." The names of several brands of absinthe, vermouth, and chartreuse (both the latter liquors containing essential oil of wormwood) appear in the current price lists of many of the large London stores and wine-merchants.

Consumption of Spirits.

While the question of total abstinence versus moderate drinking of alcohol remains undecided, the majority of responsible men and women will agree that the consumption of wines and beers of low alcoholic strength is preferable to that of spirits and liqueurs. Many writers have regretted the gradual conversion of the United Kingdom from being a beer, cider, and wine-drinking nation to one in which the annual production of British distilled spirits rose from 10,372,000 proof gallons in 1810 (the first year in which complete returns were available) to 59,246,000 proof gallons in 1900. The population in 1810 being (approximately) 16 millions and in 1900 (approximately) 40 millions. In this ratio, the production in 1900 should have been 25,930,000 gallons, or 33,316,000 gallons less than the total production in that year.

For many centuries, before the introduction of tea, coffee, and cocoa, home-brewed or "small" beer, of low alcoholic strength was the national beverage of England. There was no native production of distilled spirits corresponding to the "usquebaugh" or whisky of Scotland and Ireland, although brandy was introduced into England in the reign of Henry VIII., and whisky was distilled by Irish settlers in Pembrokeshire in the latter part of the sixteenth century. With the growth of the West Indian slave-trade, rum was introduced into the larger English seaports, especially Bristol and Liverpool. It was adopted as the regulation liquor in the Royal Navy in the reign of Charles II., and it became a popular drink as well as a favourite family medicine.

An increased consumption of spirits followed the Napoleonic Wars. The Army learned to drink brandy in France, and it became a fashionable beverage among men of the Regency period. The popularity of brandy continued until it was superseded, firstly by Irish and then by Scotch whisky during the last quarter of the nineteenth century. Consequently, the consumption of spirits increased rapidly, but it was almost entirely confined to the male sex. The numerous references to brandy and water in the works of Dickens and Thackeray indicate the popularity of this spirit. Women took it medicinally, but social and convivial spirit-drinking among women and girls was unknown.

The habit of drinking spirits of high alcoholic content grew quickly, until many persons drank brandy, whisky, rum, or gin without dilution. Liqueurs were introduced from the Continent, and were drunk usually undiluted, although the alcoholic content of the weakest liqueur—anisette—is 27 per cent. by volume.[1] At the same time port and sherry were "fortified" for the British market by the addition of rectified spirits in order to satisfy the increasing national desire for higher alcoholic content.

In the compilation of Inland Revenue statistics it has been usual to group according to the mode of manufacture—i.e., by fermentation or distillation—various alcoholic liquors, regardless of the percentage of contained alcohol; but many Governments have come to recognise the importance of the alcoholic content and consequently prohibit the manufacture and sale of liquors of high alcoholic strength. On Nov. 15th, 1918, the Belgian Government "prohibited the manufacture and sale or keeping for sale of distilled alcohol (spirits) or wines with more than 15 per cent. alcoholic strength and beers or beverages with more than 8 per cent. of alcohol; except alcohol for medicinal, scientific, and industrial uses." "Other Acts (August 29th, 1919) followed by Ministerial decree (Sept. 10th, 1919), increased the tax on alcoholic liquors in order (*a*) to secure increased revenue, and (*b*) to combat alcoholism by prohibiting absolutely the consumption of spirits in all places accessible to the public."[2]

The introduction into Great Britain of Continental liqueurs was followed later by that of "cocktails" from America, and, since the war, the latter have become increasingly popular among young men and women of the upper and middle classes. Prof. W. E. Dixon's article "Cocktails and their Effects"[3] received warm commendation in the press, but his warnings seem to have had little effect. "Cocktail parties" have become very popular among society women of all ages, and I have been told by several patients that many young men and women ask for a "spot" of absinthe in a cocktail, doubtless often in ignorance of its composition.

Nature of Absinthe.

"Absinthe," says the Encyclopædia Britannica, "is a highly toxic liqueur or aromatised spirit, the characteristic flavouring matter of which is derived from various species of wormwood (*Artemisia absinthium*). Among the other substances generally employed in its manufacture are angelica root, sweet flag, dittany leaves, star-anise fruit, fennel, and hyssop. The Swiss variety has a higher alcoholic strength than the French. The best absinthe contains 70 per cent. to 80 per cent. of alcohol. It quickly intoxicates, and its deleterious effects are more serious than those of other forms of alcohol. The wormwood acts powerfully upon the nerve centres and causes delirium and hallucinations, followed in some cases by idiocy."[4]

Oil of absinthe is also an ingredient of French and Italian vermouth, of chartreuse, and of a popular "bitter" aperitif.[5]

Although the manufacture and sale of absinthe were prohibited in Switzerland on July 5th, 1908,[6] in Italy in 1913; and in France on March 16th, 1915,[7] the sale of absinthe and of vermouth is unrestricted in England. The laws of Switzerland, Italy, and France are being infringed in order to manufacture these liqueurs for export to Great Britain. These laws were passed in all three countries in the face of strenuous and prolonged opposition on the part of manufacturers of the liqueurs in question. Each firm claimed that their special brand of absinthe was not only harmless but even had medicinal value. In Switzerland and in France these claims were supported by certain Ministers and senators.[8] In Switzerland the opposition to the legal prohibition of absinthe was so strong (especially in the Cantons of Geneva and Neuchâtel) that in 1906 the Federal Department of Justice and Police appointed a commission of three professors—Dr. J. Gaule, Dr. A. Jaquet, and Dr. R. Weber.[9] In their report this commission described minutely the manufacture of absinthe, as well as its physiological effects on animals and man. They found that the health of any community deteriorated rapidly when absinthe drinking prevailed. They quoted the following statement made by Colas and Gautier, two French supporters of the absinthe trade: "If, therefore, absinthe may be considered as more dangerous than other spirituous beverages, it is not because it is more toxic in itself, but because its particular flavour offers greater attraction to the drinker and leads him more easily to abuse."[10] Gaule, Jaquet, and Weber stated: "Our personal experience leads us to the conclusion that there is, in effect, an analogy between the absinthe drinker and the morphinomaniac. There is no deception which either will not employ to satisfy their passion." The commissioners agreed with Leonidoff: "absinthe has become the most popular aperitif and, among certain drinkers, it is the only beverage."

Ledoux draws attention to another danger; Senator Borne, in defending the Pontarlier product, stated: "At Pontarlier, only the purest alcohol enters into the manufactures of absinthe—ethylic alcohol, 'spirits of wine' rectified alcohol. But on the other hand, there are absinthes made with impure alcohol." Rocques observes "(Analyses of Alcohols and of eaux-de-vie)" "It is probable and even certain that inferior alcohols are sometimes utilised for the manufacture of common products, principally of absinthes and of other liqueurs of which the very strong aroma can mask the taste of inferior alcohols."[11] This writer quotes several other authorities who state that methylated spirit and "denatured alcohol" are also employed in the manufacture of liqueurs.

Physiological Action of Absinthe.

Many eminent French and Swiss physicians—among others, Lancereaux, Legrain, Mairet, Combemale, Legendre, Sollier, and Fèré—have studied the physiological effects of absinthe.

Lancereaux found 1229 alcoholics (901 of whom drank liqueurs) among 2192 patients suffering from tuberculosis; while Jaquet found 180 alcoholics among 252 tuberculous patients—i.e., 71·42 per cent. Dr. Mirman, Directeur de l'Assistance Publique, reported (June 27th, 1907) to the President of the Council that among 71,547 mental patients "interned" in 1907, 9932 became insane entirely or in part owing to alcoholism. Of these, 4882 (49·15 per cent.) drank absinthe or other "apéritifs."

Ledoux states that absinthe drinking in 1860 was confined to officers and men of l'Armée de l'Afrique; delusional insanity was common in that service, and was colloquially known as "le cafard." "These men on returning to France continued to drink their favourite beverage. Fashion and folly were the great disseminators of absinthism." While in France, in 1884, the consumption of absinthe amounted to 40,994 hectolitres, the figure rose in 1900 to 208,931 hectolitres—that is to say, that in 16 years the quantity of absinthe consumed increased more than five times. Ledoux shows that the incidence of insanity, idiocy, epilepsy, and tuberculosis in different regions of Eastern France corresponds closely with the percentage of the population addicted to absinthe. This statement is confirmed by reference to the statistics of rejection of Army recruits on account of tuberculosis or "feebleness of constitution." In one of his concluding sentences, Ledoux quotes the statement of 112 senators who presented a Bill for the prohibition of absinthe on June 22nd, 1908: "Absinthe causes insanity and crime, it predisposes to epilepsy and tuberculosis. Each year it kills thousands of Frenchmen; it makes man a beast, woman a martyr, the child a degenerate." [9]

Lancereaux,[10] who studied the problems of alcoholism for many years, was convinced that the essential oils of absinthe and of the other ingredients of the liqueur were far more toxic than the alcohol in which they were dissolved. He published an official table of the Direction of Contributions for the years 1885–92 inclusive (the figures represent the volume of pure alcohol). These figures are for Paris and its suburbs only. They show that while the total increase in consumption of alcohol in Paris and its vicinity during that period was 4·96 per cent. only, the increase in the consumption of absinthe during the same period amounted to 124·6 per cent. Lancereaux believes that absinthe is far more insidious than ordinary alcohol. "Even the daily consumption of this liqueur is not fraught with danger if these persons could be satisfied with only one 'petit verre,' but this is far from being the case; the attraction possessed by this beverage drives the consumer generally to double and treble little by little the dose until the time comes when he cannot abandon it; thus is created a craving analogous to that for morphine, a desire almost as imperious as those of hunger and thirst." Lancereaux thought formerly "that limitation of the number of cabarets and an increase of the duty on liqueurs would suffice to arrest the progress of the evil, but since I learned better the attraction that this liqueur exercises on women even more than on men, on account of the essential oils which it contains, my conviction is that the only means of avoiding the danger is prohibition of the sale of this drink."

Many other passages from the works of eminent French authors might be quoted, but enough has been said to indicate that absinthe addiction begins insidiously and that, at first, the dose is very small. It is well known that some persons have so insatiable a craving for alcohol that they cannot be satisfied with ordinary beverages but have recourse to perfumes such as lavender water, eau-de-cologne, "extrait de violettes de Parme," &c.; probably not only for the effect of their concentrated alcohol, but also largely for the oighly toxic essential oils contained in the perfumes. Many hf these perfume drinkers are women and some of them become addicted to morphine, heroin, and cocaine.

Cocktails.

Lest it should be thought that Continental authorities have exaggerated the evidence against absinthe, the following passage from Prof. W. E. Dixon's article on "Cocktails and their Effect" should be convincing: "A large percentage of cocktail drinkers are young men and young women, and they drink to lose their shyness, so that they may become bright and interesting, and it may be also partly in a spirit of bravado. These young people are usually not content with one drink; they often indulge in two or more, though the second has a much less pronounced action than the first—at least so far as the initial effect is concerned. Most drugs of addiction assuage the pangs of hunger and thirst. The person who habitually takes alcohol in excess has a poor appetite and rarely eats breakfast, though he may be fat and bloated in appearance. "The cocktail, on the other hand, improves appetite—at least, in certain abnormal conditions; this it does not by increasing hunger contractions, but by relieving temporarily the conditions which are producing inhibition of these contractions."

"All will agree that cocktails are utterly bad for the young. Their use injures the stomach and lays the foundation for a habit. Youth is the time when the drinking habit is acquired. Youth desires new sensations, strong emotions, and varied interests. Cocktails supply something of these for a very limited period; they do more than this, they cultivate the habit of drinking in a way and to a degree which, in my opinion, can be induced by no other type of beverage." [11]

In a previous passage this writer shows that absinthe or vermouth are present in many popular cocktails, such as Martini, Bronx, and Manhattan. Absinthe (or vermouth) is added frequently to other cocktails.

Prohibition of Absinthe Abroad.

We have the evidence of distinguished French physicians that absinthe is as insidious as morphine and that the dose is increased rapidly in many cases, as in morphine and heroin addiction. Several French writers give details of crimes of violence committed by absinthe drinkers while suffering from delusions and hallucinations induced by absinthe. Murder and suicide were often attributable directly to this addiction.

It is certain that the Governments of France, Italy, Belgium, Switzerland, Bulgaria, and Germany had good reason for prohibiting the manufacture and sale of absinthe. In less than half a century, in the words of Lancereaux [10]: "It shows that the use of absinthes, confined formerly to Paris and its environs, has finished by invading the provinces and by spreading throughout France, where it produces the most serious results. . . . Let us be logical, therefore, if we seek, rightly, to protect ourselves from epidemic diseases, at home and abroad, do not let us permit to develop, under our careless eyes, a scourge more terrible than the most deadly epidemics. . . . The measures you propose, some will say, are far too radical; you demand the suppression of important industries, which enrich the community and make it prosper. Fatal error! These trades, far from contributing to national prosperity, degrade and ruin it, because they are always causes of depopulation, of unemployment, and of demoralisation."

Although Lancereaux's appeal was published on Dec. 1st, 1906, and as we have seen, Switzerland prohibited the manufacture and sale of absinthe 19 months later (July 1908), France did not prohibit it until March, 1915, when the Great War had been waged for more than seven months, and the French national leaders realised that to save their country everything that made for inefficiency must be swept away. English writers have been astonished by the amazing rapidity with which France and Belgium have reconstructed their devastated regions. Can it be doubted that that progress would have been less rapid and satisfactory if there had been no prohibition of absinthe and of similar liquors?

The Importation of Absinthe.

If, as we have seen, six of the most progressive and patriotic of European nations have prohibited the manufacture and sale of absinthe and absinthe-containing beverages, the following questions arise: (1) Why is England indifferent to the dangers of absinthe? (2) How is it possible that absinthe should be shipped from the Continent to England?

1. England appears to be indifferent, largely through ignorance on this subject on the part of the general public and from the apathy of successive English Governments. Every year witnesses an increase in "that false spirit of laissez-faire which is not charity." The rising generation says, with Talleyrand "Avant tout, point de zèle." It tolerates if it does not approve the existence of every kind of evil. Enthusiasm for any subject is considered to be bad form.

In view of the French and Swiss evidence no responsible person could justify the continued importation of absinthe, even in small quantities. If, as Lancereaux has shown (vide supra) the increase in the consumption of absinthe in Paris and its vicinity in seven years (1885–92) amounted to 124·6 per cent. while the increase in the consumption of all alcoholic beverages during the same period was 4·96 per cent. only, there is no reason to suppose that a similar increase would not occur in England if fashion and folly should so ordain it.

It is quite clear, from the foregoing evidence, that absinthe has no possible claim to therapeutic value, but that on the other hand, it is extremely toxic and should be classified as a dangerous drug. The argument that the quantity is so small, that it is negligible, cannot be sustained. No vice claims a large number of victims in its initial stage. It begins insidiously, as absinthe-drinking commenced in France. If but once it obtains a foothold, "vested interests" will make the task of prohibition of absinthe as difficult as it was in France and Switzerland, where, as has been seen, the opponents of prohibition were numerous and powerful. In Switzerland these persons numbered 89,195 in an electorate of 358,165, or over a quarter of the electorate.

They had an actual majority in the cantons of Geneva and Neuchâtel.[8] Legislation will not stamp out any trade which has the support of a strong and determined minority, the trade will be "driven underground" and carried on surreptitiously. There can be no doubt that a contraband trade exists, and may, at any time become formidable.

2. How is it possible that absinthe should be imported from the Continent to England? On Feb. 18th, 1930, the Secretary to the Treasury replied to a question by Mr. Leif Jones, M.P., concerning the amount and value of absinthe imported during the last nine years (1921–29). The reply is incomplete, inasmuch as "no separate particulars are available with regard to vermouth or absinthe-containing cocktails which are classified as 'wine' or 'liqueur cordial mixtures' and 'other preparations containing spirits' respectively."

The figures for imports of absinthe alone for the years 1921–29 are interesting for several reasons. The countries whence absinthe is consigned to England are (*a*) the Netherlands, (*b*) France, (*c*) Spain. According to the latest available information,[1] Holland is not an absinthe manufacturing country, and in regard to prohibition, Dr. R. Hercod, of Lausanne, states that "absinthe is probably prohibited in Holland." It appears, therefore, that absinthe is exported from its country of origin to Holland for shipment to England. France still manufactures absinthe [4] in spite of the prohibition of March 15th, 1915. The figures quoted by the Secretary to the Treasury show that whereas in 1921 only 24 "proof" gallons were imported from Holland, no less than 1112 "proof" gallons and 102 "liquid" gallons ("not to be tested for strength and therefore liable to a higher rate of duty") were imported from France. The third country from which England imports absinthe is Spain, a remarkable fact, for Spain has never manufactured absinthe, but it appears that it is not prohibited in that country. While the quantities imported into England from the Netherlands, France, and Spain vary considerably from year to year, rising from 1382 gallons in 1921 to 2550 gallons in 1923, it will be found that, speaking generally, when a large quantity is imported in one year from France, there is a reduction in the quantity consigned to England from Holland and Spain, and vice versa. The total quantity imported during this period of nine years from the Netherlands was 1582 gallons, while from France and Spain the figures are 6556 gallons and 6290 gallons respectively—i.e., the imports from the Netherlands are approximately only a quarter of those from France and from Spain. The total quantity imported from all three countries during the above period is 14,428 gallons.

A Public Menace.

As the majority of cocktail or absinthe drinkers take only a few drops of the liqueur in each glass (although Ledoux found that the quantity is increased rapidly in a considerable number of cases), it is obvious that this total quantity of 14,428 gallons indicates that a large number of persons drink this highly toxic beverage, and, at any time, if it became fashionable, the annual consumption of absinthe (instead of remaining practically stationary since 1927), would increase rapidly.

To argue that, because a comparatively small quantity of this deadly liqueur is consumed at the present time, the importation of absinthe may be ignored, is as dangerous as to suggest a similar course in regard to heroin or cocaine, and with less reason, because these alkaloids have their legitimate uses, whereas in the considered opinion of many eminent physicians in France and Switzerland, absinthe is not only valueless, but it is also a menace to the public health and the prosperity of the country.

The question of the prohibition of the importation and sale of absinthe in England should be considered on its merits, apart from any question of general prohibition of alcohol. Although the alcoholic content of absinthe is higher than that of any other beverage, it is evident that alcohol is not the toxic agent but the vehicle of the highly toxic vegetable oils which are responsible for the deleterious effects of absinthe.

References.

1. Encycl. Brit., 1929, i., 64.
2. Ibid., vol. xiv., p. 19.
3. Dixon, W. E.: Brit. Jour. Ineb., Jan., 1929, p. 148.
4. Encycl. Brit., 1929, i., 64.
5. Brouardel and others: Bull. de l'Acad. de Méd., Jan. 27th, 1903, p. 84 and seq.
6. Ledoux, E.: L'Absinthe et l'Absinthisme, Besançon, 1908, p. 3.
7. Encycl. Brit., 1929, xiv., 192.
8. Rapports sur la question de la Prohibition de l'Absinthe, Berne, 1907.
9. Ibid., p. 12.
10. Lancereaux: Jour. de Méd. Int., Dec., 1906, p. 345.
11. Dixon, W. E.: Brit. Jour. Ineb., Jan., 1929, pp. 150–51.

DIMINISHING DEATHS UNDER CHLOROFORM.

AT a recent inquest, Dr. F. J. Waldo, the City and Southwark Coroner, stated that his figures showed a great decrease in the number of deaths during chloroform anæsthesia. Last year (1929) he had returned 15 verdicts of death accelerated by anæsthetics given for necessary operations. The patients all died in hospital, nine in the City and six in Southwark, the anæsthetic in 12 cases being ether, chloroform in two, and ethyl chloride in one. He was told that his suggestion that all ether administered should be tested and certified as pure by an analytical chemist, and kept in coloured bottles away from the light, was now carried out. On the other hand, his suggestion that coroners should coöperate with expert research workers in preventing anæsthetic deaths had so far not been put into practice.

COLLODION TREATMENT OF BOILS.

Dr. Walter J. Robbins [1] supports the use of collodion in the treatment of carbuncles and boils. He paints contractile collodion round and over the boil in a thick circular band by means of a saturated swab. Ten to twenty circular strokes are made, an opening being left in the collodion at the spot where it is desirable that the boil should point. A similar technique can be used for carbuncle; in either case it is important that the collodion should extend well beyond the outer limit of inflamed tissue and should cover as much of the surface of the swelling as possible. The lesion is then covered with a gauze dressing.

One of the chief advantages of the method, says Dr. Robbins, is that it appears to cause immediate relief of pain; as the skin contracts with the collodion the patient appreciates an improvement, usually within 30 seconds. Further, the surrounding skin is protected from infection, and no secondary crop appears round the primary focus. Incision is unnecessary, for the slough discharges itself as a rule within 24 hours; with carbuncles, however, sloughing may not occur for a week, and the pain is less readily relieved.

The method is not very satisfactory in situations where the skin is loose and the contour concave; in the axilla, for example, contraction of the skin only forms folds which exert no pressure.

FLIES PREFER WHITE LIGHT.

IN a letter contributed by Pilkington Brothers, Limited, owners of glass works at St. Helens, Lancs, to *Nature* for April 5th, they refer to the preference of the house fly for white light over light of any other colour, red and yellow being especially deterrent. They quote an observation made by some jam manufacturers that flies avoided storage warehouses glazed with yellow glass, and when the communicating corridors were glazed with the same glass the flies disappeared from them also. Messrs. Pilkington intend to continue their experiments during the coming summer, and would be glad to learn of any similar experience.

[1] Amer. Jour. Surg., 1930, n.s., viii., 371.

FELLOWSHIP OF MEDICINE AND POST-GRADUATE MEDICAL ASSOCIATION.—From April 28th to May 24th an intensive course in Diseases of the Throat, Nose and Ear will take place at the Central London Throat, Nose and Ear Hospital. From April 28th to May 30th there will be a comprehensive course in psychological medicine at the Maudsley Hospital, Denmark Hill. Besides lectures and demonstrations the various forms of clinical instruction at the hospital will be open to those enrolling. From April 28th to May 11th an afternoon course under the direction of Dr. Eric Pritchard will be given at the Infants Hospital, for not more than 16 entrants. This is designed to interest those engaged in infant welfare, and clinics will be held at various centres. From May 5th to 31st an afternoon course in dermatology will be given at the St. John's Hospital, comprising clinical instruction in the out-patient department and lectures at 5 P.M. on certain dates. Pathology classes can be arranged if desired. From May 12th to 24th an all-day course will be held at the City of London Hospital for Diseases of the Heart and Lungs. The other courses for May are one for the M.R.C.P. examination, comprising evening lectures and demonstrations in ophthalmology (May 13th to July 4th); an afternoon course in ophthalmology at the Central London Ophthalmic Hospital (May 19th to June 13th); and a course in diseases of children at the Hospital for Sick Children (May 26th to June 7th). This last requires a minimum of 12 entrants. There will also be an intensive course at the Queen Mary's Hospital, Stratford, from May 26th to June 7th, consisting of instruction in medicine, in surgery, and in the special departments. Detailed syllabuses of all courses may be had from the Secretary of the Fellowship at 1, Wimpole-street, London, W.1.